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GENERAL INDEX.

(Illustrated articles are designated by an asterisk* before the page number.)

A. A. A. S. Botanical Club Meeting at Toronto, 242.
A. A. A. S. Botanical Club's trip to the Lakes of Muskoka, 285.
Actinodiscus Atlanticus, n. sp., 72.
Algæ, Some new or imperfectly known, *1.
Algæ, Fresh-Water, of Maine, 181.
Allium stenanthum, n. sp., 152.
Alsodeia ovalifolia, spec. nov., 18.
Andropogoneæ, List of North American, 233.
Aphyllon fasciculatum, 330.
Aphyllon fasciculatum in Montana, 215.
Arthonia albo-virescens, spec. nov., 105.
Aster cordifolius, var. lanceolatus, n. var., 68.
Aster cordifolius, var. lævigatus, n. var., 67.
Astragalus capitellus, spec. nov., 260.
Barbula megalocarpa, n. sp., 92.
Bauhinia Rusbyi, spec. nov., 326.
Biddulphia ? ? n. sp., *208.
Biddulphia Brittoniana, n. sp., 73, *208.
Biddulphia Cookiana, n. sp., *73.
Biddulphia Woolmanii, n. sp., *74.
Boehmeria cylindrica, var. scabra, n. var., 21.
Botanical Notes, 21, 55, 78, 112, 136, 161, 196, 225, 248, *266, 277, 330.
Botanical reading done in the laboratory of Prof. Schwendener, Notes on, 297.
Botany of Humboldt County, Cal., 147.
Brunellia Oliverii, spec. nov., 160.
Bryology, American, contributions to, *107.
Bryology of Canada, contribution to, 91.
Bryum angustirete, n. sp., 95.
Bryum hydrophyllum, n. sp., 95.
Bryum meesioides, n. sp., 95.
Bryum Ontariense, n. sp., 96.
Bryum Vancouveriense, n. sp., 95.
Buettneria Benensis, spec. nov., 155.
Buettneria Boliviana, spec. nov., 155.
Buettneria coriacea, spec. nov., 156.
Buettneria pescapræifolia, spec. nov., 155.
Californian Plants, new, 221.
Calliandra Boliviana, spec. nov., 327.
Cardamine speciosa, spec. nov., 16.
Carex umbellata, Schkuhr, 218.
Chrysymenia pseudodichotoma, n. sp., *1.
Classification of slight varieties, 328.
Color as a distinguishing feature of certain plants, 268.
Corema in New Jersey, 193.
Corema, with Pinus Banksiana on the coast of Maine, 295.
Corydalis sempervirens, Wave-growth of, 293.
Coursetia Boliviana, spec. nov., 260.
Cremalobus Bolivianus, spec. nov., 17.
CONTRIBUTORS:
  Anderson, F. W., 217.
  Bailey, L. H., 218, 328.
  Bailey, W. W., 23, 136, 329.
  Beauchamp, W. M., 54.
  Bebb, M. S., 22, 39, *211,
  Best, G. N., 161.
  Bicknell, E. P., 51.
  Britton, Elizabeth G., 79, *107, 120, 141, 167, 196, 225, 250, 307, 331.
  Britton, N. L., 13, 56, 61, 83, 113, 123, 125, 132, 153, 166, 171, 189, 196, 197, 202, 205, 246, 259, 272, 282, 284, 306, 311, 312, 335, 336, 337, 338, 340.
  Calkins, W. W., 330.
  Cockerell, T. D. A., 270.
  Day, David F., 285, 291.
  Drew, E. R., 147.
  Eckfeldt, John W., 104.
  Farlow, W. G., *1.
  Foerste, Aug. F., *266.
  Gregory, Emily L., 25, 28, 79, 80, 82, 113, 222, 224, 252, 279, 297, 332.
  Halsted, Byron D., 130, 135, 166.
  Harvey, F. L., 181.
  Hitchcock, A. S., 69.
  Hollick, Arthur, 30, 55, 84, 116, 132, 139, 167, 170, 177, 199, 227, 252, 280, 305.
  Jackson, Joseph, 137.
  James, Joseph F., 268.
  Johnson, L. N., 263, 330.
  Kain, C. H., 32, 33, 57, *71, *207.
  Lemmon, J. G., 221.

Macoun, John, 91.
Meehan, Thomas, 24, 49, 68, 293.
Millspaugh, C. F., 65, 136.
Morong, Thomas, 43, 273.
Northrop, J. I., 164, *165.
Parry, C. C., 277.
Porter, T. C., 21, 24, 53, 67, 220, 277.
Rand, Edw. L., 294.
Redfield, John H., 193, 295.
Rich, Alice B., 112.
Rusby, H. H., 33, 35, 37, 55, 205, 227.
Schrenk, Jos. *315.
Schuh, R. E., 137.
Schultze, E. A., *71, *98, *165, *207.
Scribner, F. Lamson, 233.
Sterns, E. E., 21, 77.
Sturtevant, E. Lewis, 24.
Underwood, L. M., 138.
Willey, Henry, 198.
Willis, O. R., 278.
Dalea Boliviana, spec. nov., 259.
Desmodium Mandoni, spec. nov., 261.
Desmodium Yungasense, spec. nov., 261.
Diatomaceous deposit, from Atlantic City, Fossil Marine, *71, *207.
Diatoms, Descriptive list of Staten Island, *98.
Dichelyma longinerve, n. sp., 97.
Dicranella parvula, n. sp., 91.
Dicranum leioneuron, n. sp., 92.
Dicranum scoparium, var. scopariforme, n. var., 92.
Dicranum stenodictyon, n. sp., 92.
Dictyosiphon Macounii, n. sp., *11.
Dimeregramma Novæ-Cæsaræa, n. sp., *74.
Draba Crockeri, n. sp., 221.
Duguetia glabra, spec. nov., 14.
Ectocarpus tomentosoides, n. sp., *11.
Elastic stamens in Compositæ, 68.
Epilobium exaltatum, n. sp., 151.
Eriogonum speciosum, n. sp., 152.
Eunotia Americana, n. sp., *209.
Euphorbia Montereyana, sp nov., 66.
Euphorbia occidentalis, n. sp., 152.
Euphorbia radioloides, var. rubra, n. var., 65.
Euphorbiaceæ Mexicanæ, 65.
Flora of Iowa, Additions to, 69.
Flora, Native, Additions to, 21.
Flora of Richmond Co., N. Y., 132.
Flora of the Palisades of the Hudson, 51.
Freziera inæquilatera, spec. nov., 63.
Galactia montana sp. nov., 324.
Gaylussacia resinosa, var. leucocarpa, n. var., 21.
Gentiana alba, 53.
Geum album, var. flavum, n. var., 21.
Glœosiphonia verticillaris, n. sp., *3.
Graphis abaphoides, spec. nov., 105.
Grimmia arcuatifolia, n. sp., 93.
Helicteres Rusbyi, spec. nov., 154.
Hemizonia scabrella, n. sp., 151.
Heppia omphaliza, spec. nov., 106.
Hosackia denticulata, n. sp., 151.
Hypnum hæmatidens, n. sp., 97.
Hypnum Leibergii, n. sp., 111.
Index to recent American Literature, 30, 55, 84, 116, 139, 167, 199, 227, 252, 280, 305, 333.
Iowa Flora, Additions to, 69.
Labiatæ, On gyno-diœcious, 49.
Lecidea Floridensis, spec. nov., 104.
Leskea nigrescens, n. sp., 97.
Lichens, Some new North American, 101.
Lupinus adsurgens, n. sp., 150.
Lupinus sylvestris, n. sp., 150.
Malvastrum Rusbyi, spec. nov., 64.
Mandioca, 273.
Merceya latifolia, n. sp., 94.
Mollia Boliviana, spec. nov., 156.
Monnina Boliviensis, spec. nov., 20.
Morisonia oblongifolia, spec. nov., 17.
Nama densa, n. sp., 222.
Navicula De Wittiana, n. sp., *209.
Navicula Schultzei, n. sp., *75.
Navicula trinodis, var. inflata, n. var. *101.
Nesæa verticillata, On the floating tissue of, *315.
Nodularia Mainensis, n. sp., 188.
Notes from New Hampshire, 329.
Onondaga Indian names of plants, 54.
Oxalis Andina, spec. nov., 159.
Oxalis Boliviana, spec. nov., 159.
Ovary, The ideal, 77.
Phillippine Islands, Notes from 217.
Physcomitrium megalocarpum, n. sp., 94.
Pinus Banksiana on the coast of Maine, 294.
Pinus Banksiana with Corema Conradii, 295.
Plants collected by Dr. H. H. Rusby in South America, An enumeration of, 13, 61, 153, 189, 259, 324.
Pollen, Germination of, 130.
Pollen Measurements, Observations upon, 135.
Polygala Andina, spec. nov., 19.
Polygala formosa, spec. nov., 19.
Polytrichum Macounii, n. sp., 96.
Potentilla congesta, var. lobata, n. var., 221.
Potentilla laxiflora, n. sp., 151.
Proceedings of the Club, 37, 59, 89, 123, 146, 178, 206, 313, 340.
Protium Bolivianum, spec. nov., 189.
Racomitrium Macounii, n. sp., 93.
Rangely Lakes, A trip among the, 263.
Ranunculus aquatilis, var. hispidulus, n. var., 150.
Reviews of Foreign Literature, 25, 79, 113, 137, 165, 197, 222, 248, 279, 331.
Rhabdonema Atlanticum, n. sp., *75.
Rhododendrons, Notes on two, 220.
Rosa, Remarks on the group Carolinæ of the genus, 161.
Rourea Bakerana, spec. nov., 192.
Saurauja Rusbyi, spec. nov., 64.

Scorozonella arguta, n. sp., 152.
Sida Benensis, spec. nov., 153.
Sisymbrium Rusbyi, spec. nov., 16.
Slight varieties, Classification of, 270.
“ “ Remarks on, 272.
South American Vegetation, First Glimpses of, 43.
Stigmatidium inscriptum, spec. nov., 105.
Subularia aquatica, New locality for, 291.
Thinouia coriacea, spec. nov., 191.
Tissa macrotheca, var. scariosa, n. var., 129.
Tissa pallida, n. sp. 129.
Tissa, Preliminary Note on the North American Species of the Genus, 125.
Triceratium Heilprinianum, n. sp., *210.
Triceratium indentatum, n. sp., *210.
Triceratium Kainii, n. sp., *76.
T. Kainii, var. constrictum, n. var., *210.
Trigyneia Boliviensis, spec. nov., 14.
Varieties, Classification of slight, 270, 272, 328.
Viola Boliviana, spec. nov., 18.
Viola Bridgesii, spec., nov., 18.
Viola thymifolia, spec. nov., 18.
Willows, White Mountain, 39, 211.
Wissadula Andina, spec. nov., 153.
Xanthidium cristatum, var. truncatum, n. var., 186.

ERRATA, VOLUME XVI.

Page 97,	line 33,	for *hamatidens*,	read *hæmatidens*.
“ 132,	“ 33,	“ *glabratus*,	“ *lævigatus*.
“ 136,	“ 30,	“ Feb, 26th,	“ March 26th.
“ 204,	“ 5,	“ *Nitella*,	“ *Mitella*.
“ 217,	“ 9,	“ Megros,	“ Negros.
“ 217,	foot note	“ Prof. Sture,	“ Prof. Steere.
	and	“ 1889,	“ 1888.
“ 330,	line 16,	for Guineentium,	read Guineensium.

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TORREY BOTANICAL CLUB.

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On Some New or Imperfectly Known Algæ of the United States. I.

BY W. G. FARLOW.

(Plates LXXXVII and LXXXVIII.)

CHRYSYMENIA PSEUDODICHOTOMA n. sp., pl. LXXXVIII, figs. 7 and 8.

Fronds 4 to 8 inches high, with discoidal base and a solid, cylindrical, cartilaginous stipe which branches monopodially and ends in ovate or obovate saccate extremities, ½ to 1 inch long, ¼ to ½ inch broad, at the bases of which unilateral branches are given off repeatedly and, elongating and forming new terminal sacks, cause the older parts of the stipe to appear to be dichotomous with more or less widely spreading and flexuous divisions. Cystocarps borne in the walls of the sacks, projecting externally and internally, with distinct carpostomes. Tetraspores ?

Santa Barbara, Monterey, Santa Cruz and St. Vincent, Cal.

The determination of this species has caused much perplexity among American algologists. The first specimens seen were collected at Santa Cruz by Dr. C. L. Anderson in 1876 and were sterile. In them the saccate branches were numerous and the stipes comparatively short, so that there was a certain resemblance to species like *Chrysymenia obovata*, Sond., and the species was quoted under that name in Proc. Am. Acad. Arts and Sci., vii., 242*. Larger sets of specimens received later from Mrs.

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*By a misprint as *Cryptonemia obovata*.

Bingham, Miss Lennebacker and Mrs. Bush showed that this determination was incorrect, and, in the absence of fruit, it was doubtful whether the plant was a *Chrysymenia* and might not be possibly the alga cited under the name of *Lomentaria saccata* in the Nereis Am. Bor. founded on Californian specimens of *Dumontia saccata* from Herb. Greville, and later transferred to the genus *Erythrocystis,* by Prof. J. G. Agardh. Through the kindness of Prof. Balfour, I have been able to examine the specimens of *Dumontia saccata* in Herb. Greville. There are two specimens marked "California, Douglas, Hort. Soc. Lond., 1833." Examination shows that both of these specimens, which are in fruit, are beyond doubt *Ricardia Montagnei,* Derbes. and Sol., similar in all respects to the specimens of *R. Montagnei,* var. *gigantea,* from California distributed in Alg. Am. Bor. Exs. no. 58. In the specimens of Douglas, as in those in Alg. Am. Bor., the *Ricardiæ* were growing on *Laurencia virgata,* as that species is understood by American algolgists.

The fruit of *C. pseudodichotoma* appears not to be common, but I have received from Mrs. A. E. Bush good fruiting specimens collected at Monterey, and the structure of the cystocarps as shown in plate LXXXVIII, fig. 7, confirms the opinion previously reached from an examination of the frond that the plant is a *Chrysymenia.* The figure, it should be said, was drawn from a section of a plant which had been pressed, and therefore the two sides of the sack are brought much closer together than they are in the living plant. The wall of the cystocarp is formed from the enlarged walls of the sack, and the spores are arranged around the carpogenic cell in a somewhat reniform mass composed of different lobules in which the spores are densely packed together, but arranged in short digitate moniliform rows, as can be seen by applying reagents. In fig. 8 the method of branching is shown. At the base of the largest sack which terminates the main stipe a branch is given off at right angles which also ends in a sack and the process is again repeated. At the point *a,* where another branch is given off, there is an indentation on the upper side of the angle formed with the main stipe which marks the spot where there had previously been a terminal sack which has now disappeared, so that the large sack of the figure which appears to terminate the main stipe is really at the tip of an elongated lateral branch. The axis of the stipe is composed of large ellipsoidal or short cylindrical cells densely packed together and the cortex of a thin layer of polygonal colored cells. The sacks are much more succulent and more brightly colored than the stipe and the structure of their walls is sufficiently evident from fig. 7.

GLŒOSIPHONIA VERTICILLARIS, n. sp. Pl. LXXXVIII, figs. 5, 6, 9, 10.

Fronds usually gregarious, solid, becoming hollow with age, main axis filiform-cylindrical, finely attenuated towards the discoidal base, 2 to 8 inches long, about ⅛ inch in diameter, usually undivided and clothed throughout its length with whorls of 3 to 6 fusiform branches, ¼ to ½ inches long. In some cases a few of the lower branches are transformed into secondary axes with whorls. Cystocarps numerous, immersed among the cortical filaments of the branches, destitute of proper envelope. Sporiferous mass simple with a thin gelatinous covering. Tetraspores ?

On stones in shallow coves, Santa Cruz, Cal.

This is another of the many interesting species discovered by Dr. Anderson. It is of a soft gelatinous substance and a beautiful rose color when fresh, but is so delicate that it is easily broken. The microscopic structure of the frond is like that in species of *Calosiphonia* and *Glœosiphonia.* There is a single axial filament of large cylindrical cells from whose central portions arise at right angles whorls of four branches which divide dichotomously. From the lower joints of the branches arise a series of descending filaments which interlace with one another and give compactness to the axis of the frond. By successive dichotomies of the horizontal whorls, the cells becoming shorter and rounder, there is formed a series of corymbose branches which make the cortex of the frond. The fructification is shown in Plate LXXXVIII, figs. 5, 6 and 10. The figures were drawn from alcoholic material collected by me in April, 1885. As far as I could judge from this material, the antheridia formed small spots on the surface of the fructiferous whorls, but, as I found them in only a few cases, it may be that the spots seen were not really antheridia. The procarps are abundant at the base of the corymbose branches, and often occur in pairs. From fig. 6, which represents a procarp, it will be seen that from a single basal cell arise a number of short branches. In fig. 6, two branches and a part of a third branch are seen, but the number is often greater than three. Of these branches only two, *ac* and *b* of the figure, are concerned in the production of the cystocarps. The other branches grow into short filaments with nearly spherical cells, and make their way amongst the filaments of which the frond is composed, their general direction being parallel to the surface of the frond. The branch *ac* bears at the tip the long hyaline trichogyne which makes its way, usually more or less twisted, between the corymbose branches to the surface. In the lower part it is very much constricted where it passes into the bulbous trichophore. Below the trichophore is the cell *a*, which pushes out to one side and becomes much enlarged. Its contents are darker colored and more granular than those of the neighboring cells, and I was unable to find that in any stage the bulbous portion was separated from the smaller portion by a cell wall. The sporiferous masses do not arise from the cell *a*, but from the cell *b*, which lies in a small branch close to that which bears the trichogyne. The cell *b* has densely granular contents like those of the cell *a*, and the branch is continued beyond *b* usually by two smaller, more nearly hyaline cells. In fig. 5 the later development of the branch of which *b* is the most prominent cell is shown. The two terminal cells remain nearly unchanged, but the cell *b* of fig. 6 divides into three cells, of which the central one, *b* of fig. 5, is larger and more nearly spherical than the other two which lie immediately above and below it. These three cells have dark colored contents. The lower cells of the branch enlarge somewhat and divide in a direction parallel to the length of the branch, and subsequently some of them develop into short moniliform branches similar to those already described.

The branch becomes curved, and the three dark colored cells, which are sometimes increased to four by an additional cross-division, are so arranged that the cell *b*, the real carpogenic cell, lies at the apex of convexity; *b* is then divided into two cells placed respectively on the concave and convex sides of the branch. The cell on the upper convex side is next divided by longitudinal partitions into several wedge-shaped cells, which increase rapidly in size, and form a partial ring around the unchanged cell which is on the concave side. The wedge-shaped cells divide repeatedly until they are transformed into radiating filaments, each cell of which develops into a spore. A mature spore-mass is shown in fig. 10. The sub-moniliform spores are embedded in a mass of jelly which nearly encloses the carpogenic branch of which the lower portion is shown in the figure.

Although the present alga resembles somewhat species of *Nemalion* and *Nemastoma*, the central axial filament excludes it from *Nemastoma*, and the development of the cystocarps is not that of *Nemalion*. Considering the structure of the frond alone, it might belong either to *Calosiphonia* or *Glœosiphonia*. The radiating arrangement of the spores, which all mature at the same time, seems to warrant placing it in *Glœosiphonia*. The account of the development of the cystocarp given above, although deficient in an essential point, conforms better to what is known in *Glœosiphonia* than in any other genus. The trichogyne *c* and the hypogynous cell *a* of my fig. 6 agree with the account of *G. capillaris* given by Bornet in Notes Algol., i., 42, Plate XIII, 7, and by Fr. Schmitz in Sitzungsber. Berlin Akad. Wiss., x., Plate V, 8. According to Bornet the carpogenic cell is in close contact with the trichophoric apparatus. This appears not to be the case with *G. verticillaris*, in which the carpogenic cell is on a separate branch, more like the figure of Schmitz. I have been unable to ascertain the mode of contact between the trichophoric apparatus and the carpogenic cell, for I find nothing in my material which shows a growth of tubes like the *c* and *c*-1 in Schmitz's fig. 10. We cannot suppose that the fertilizing impulse is propagated down the whole length of the trichophoric branch and up to the cell *b* of fig. 6. As no connecting tubes were seen, it may be that the carpogenic branch when in its normal position curves closely over the trichophoric branch just below *a* and that a communication is there established. No dissections and no reagents which I have tried, showed this, however.

Nemalion Andersonii, Farlow. A description of this species was given in Proc. Am. Acad. Arts and Sci., vii., 235. Since then I have received from Mr. C. C. Merriman a *Nemalion* from St. Kilda, Australia, which bears a strong resemblance to the Californian alga, and the question arises whether it may not be that both should be regarded as forms of *N. ramulosum*, Harv., described from New Zealand. I have no means of settling this point, but the strong resemblance of the two plants from opposite sides of the Pacific should be noted.

Hildenbrandtia rosea, Kg. This species was first reported as occurring in this country in Rept. U. S. Fish Comm. for 1871. The same plant under the name of *H. sanguinea* appears to have been previously reported by Mr. J. L. Russell in 1856, in Proc. Essex Inst. i., 193, as occurring at Salem, Mass. *H. sanguinea*, *H. rubra* and *H. rosea* are all referred by Hauck to *H. prototypus*, Nardo.

Choreocolax Polysiphoniæ, Reinsch, Plate LXXXVIII, fig. 3. This species of the Atlantic shore of North America was described and figured by Reinsch in Contrib, ad Algolog, et Fungolog. In May, 1888, some specimens of *Polysiphonia fastigiata* were collected at Nahant by Mrs. R. S. Eigenmann. On the upper parts, especially at the dichotomies, were small hemispherical masses of a brownish color and cartilaginous consistency and hardly an eighth of an inch in diameter, which, on examination appeared to be without doubt Reinsch's species, although not agreeing in all respects with his figure. As far as I am aware, no fruit, either tetrasporic or cystocarpic, has previously been described. The specimens from Nahant contained tetraspores. The hemispherical external part of the frond consists of a mass of filaments composed of purple colored cells which branch and radiate to the surface, where they end in pyriform cells encased in a dense mass of jelly. The tetraspores are formed from the terminal cells and are usually cruciate, but not rarely tetrahedral.

Fucus edentatus, De la Pylaie. The *F. furcatus* of Marine Algæ of New England is without doubt the same as *F. edentatus* of Newfoundland, formerly united with *F. furcatus*, Ag., of the North Pacific, a species to which was also referred a *Fucus* of the northern coast of Norway. Later the two species were kept distinct by Prof. J. G. Agardh, and Kjellman in the Algæ of the Arctic Sea referred the so-called *F. furcatus* of Norway and

Greenland to *F. edentatus* where our common New England alga also belongs, although the *Fucus furcatus* of our west coast may perhaps be the same as the original *F. furcatus* of C. A. Agardh's Icon. Ined. *F. edentatus*, which is common from Boston northward, has recently also been found south of Cape Cod, at Groton, Conn., by Mr. W. A. Setchell. In the paper by Mr. W. M. Woodworth on "The Apical Cell of Fucus," Annals of Botany, i, the *F. furcatus* mentioned is in reality *F. edentatus.*

Fucus evanescens, Ag., was also found south of Cape Cod at Groton, Conn., by Mr. Setchell.

Fucus platycarpus, Thuret. This common European species, recognized by the monœcious conceptacles and margined receptacles, has only recently been recognized with certainty on our eastern coast. It appears to be not uncommon at Nahant, Mass., and is in good fruit in October.

Nereocystis gigantea, Aresch. A second species of *Nereocystis* from the coast of California was described by Areschoug in Bot. Notiser, 1876, p. 71, which in Bot. Notiser, 1881, p. 49, was made the type of a new genus, *Pelagophycus.* The two species of *Nereocystis* are certainly distinct, but in my own opinion they form one very natural genus from which *Pelagophycus* cannot be separated generically. The specimens described by Areschoug were collected near San Francisco by Dr. Eisen, and the same plant has been occasionally seen by Dr. Anderson at Santa Cruz, but, strange to say, the locality where it most abounds is much farther to the south, at Pt. Loma, near San Diego, Cal., and extending to Todas Santos Bay, in Lower California, where it was found by Mr. Orcutt and Mrs. Eigenmann. Near San Diego, according to Mr. D. Cleveland, it appears to be the only *Nereocystis* which occurs, certainly in any quantity. It is difficult drying specimens of this very succulent plant, and even in a climate as dry as that of California, it usually rots without drying, but, in the hotter air of Lower California, according to Mrs. Eigenmann, it is often found dried on the beach and the bladders are used for making a rough sort of lamp. *N. gigantea* differs from *N. Lütkeana* in having the fronds above the bladder, borne not on short pedicels, but on dichotomous stipes several inches long. Whether the ciliate margins are also specific is less certain, for, in this respect, there are variations in both species. The following notes made by Mr. Cleveland will be read with interest, as he has had excellent opportunities for examining this species. The notes refer to a large specimen:

"Bladder 5½ by 6 inches in diameter, being slightly flattened, with wall ¾ inch thick, and a chamber cavity about 4½ inches in diameter. The base of the bladder narrows into a constriction 1½ inches in diameter, below which the bladder expands to 2¾ inches, gradually tapering for 4½ feet, where it is only ½ inch in diameter, when it narrows down for a foot to ⅜ inch, which diameter is kept for the remaining length of the stipe, in all about 90 feet, terminating in the hold-fast, which is about one foot in diameter. The spherical bladder-head has a channel about the size of a goose-quill leading into the lower and longer chamber, which is about two inches at the broadest part, gradually narrowing for about five feet, when the chamber ends and the stipe becomes solid. The upper bladder contained about one-half pint of water.

"Two long arms stretch out from the apex of the bulb to a length of 5 feet 6 inches. The common stem at the junction, or starting point, is 2 inches in diameter and about 2 inches long before the arms diverge. At the shoulder the arms are each 1¼ inch in diameter and narrow gradually to the tip. The arms send out single branchlets along their length at intervals of 7½ inches at the base to 14 inches near the tips, the spaces between these branches increasing towards the outer extremity of the arms. The two lower branches are about 11 inches long and fork once, the forks being about 7 inches long. The other branches also fork, each fork terminating in a leaf about 3 to 4 inches broad, and from 2 feet and upwards in length. The arms and branches are round at the base and gradually flatten as they approach the terminal leaves. The arms and branches bear a strong resemblance to the antlers of a large stag."

Nereocystis Lütkeana (Mert. fil.), Rupr. The common and long known bladder kelp of California does not make its appearance until summer and autumn, and, at the time of my visit in April and May, 1885, there was scarcely a trace of it to be seen. Miss Lennebacker, however, was so good as to present me with a series of young plants which she had collected, which illustrated a very interesting point in the development. The young plants about 4 inches long are destitute of bladders, and look like young *Laminariæ* of the digitate section. The stipe is slender and short, and expands into a narrowly ovate lamina which soon becomes cleft, the divisions reaching nearly to the base. The young bladders begin to show themselves when the plants are about 8 inches long, and appear as obovate sacks at the tip of the stipe and bear on their upper margin the then comparatively broad, cleft lamina which as yet does not clearly show the divisions into two parts which is seen later.

Alaria esculenta (L.,), Grev., f. *musæfolia,* De la Pylaie, is said by Foslie in "Kritisk fortegnelse over Norges Hansalger," to be identical with *Fucus pinnatus* of Herb. Gunner.

Laminaria platymeris, De la Pylaie. Areschoug in Observations Phycologicæ, part iv., p. 2, states that this species is identical with *L. Cloustoni.*

Laminaria caperata, De la Pylaie, is said by Areschoug, l. c., p. 14, to be the true *L. saccharina.*

MESOGLOIA ANDERSONII Farlow, Pl. LXXXVII, fig. 2.

Fronds gelatinous, solitary or gregarious, cylindrical, 3-10 inches long, ⅛ inch in diam., repeatedly and irregularly dichotomous, secondary divisions occasionally subpinnate, tips scarcely attenuated, clothed with projecting hairs when young. Cortical filaments moniliform, erect, becoming somewhat recurved. Unilocular sporangia at the base of cortical filaments scattered uniformly over the surface of frond, pyriform, 36-45 μ by 18-21 μ.

On stones in shallow coves. Santa Cruz, Cal., Dr. Anderson 1875; San Diego, Dr. E. Palmer, 1875; Santa Barbara, Miss Lennebacker, 1877; Cape Mendocino, C. G. Pringle, 1882.

This species, first found by Dr. Anderson at Santa Cruz, was issued in Alg. Am. Bor. Exs., no. 163, in June, 1881. The first specimens received were sterile and the generic position could not be determined with accuracy. Fruiting specimens were received later and it was supposed when the alga was distributed in 1881, that the specimens in Alg. Am. Bor. were all fertile, but this could not have been the case, since a doubt has arisen whether the plant really belongs to the Chordarieæ, and, in Till algernes Systematik* p. 76, Prof. J. G. Agardh, judging from the structure of the frond, suggested that it probably belonged in Sporochnoideæ near *Nereia.* The uniform distribution of the sporangia over the whole surface of the frond, not in verrucæform spots, shows however, that it belongs in Chordarieæ and not in Sporochnoideæ. But it is not so easy to decide upon the exact genus in which it should be placed, for algologists differ widely as to the limitation of the genera of Chordarieæ. The axis is composed of filaments of large cylindrical cells closely packed in the upper and younger parts of the frond which, in the lower part, becomes hollow with age. From these larger, colorless filaments are given off smaller filaments,which make their way to the surface of the frond where they ramify irregularly and from them are given off at right angles tufts of short, brownish filaments, which form the cortical layer. The latter are moniliform, at first erect, later somewhat recurved over the unilocular sporangia which are formed at their base.

Although the genus cannot be absolutely settled until the trichosporangia are better known, there being no indication of the secund outgrowths of the cortical filaments which mark the genus *Castagnea*, nor of the discoidal cells characteristic of *Cladosiphon* as limited by Prof. Agardh, l. c., p. 8, our plant must be referred either to *Mesogloia* or *Myriocladia.* Writers differ very much as to the distinctions between the two genera. According to Agardh, those species are placed in *Myriocladia* which have filaments that project beyond the cortical layer, and in which the cortical filaments in which the trichosporangia are formed, become moniliform, tapering at both ends. As far as the cortical filaments are concerned, *M. Andersonii* does not agree in structure with *Myriocladia.* The existence of filaments which project beyond the surface of the frond is the only mark which would lead one to refer it to *Myriocladia.* They, however, are only found in certain stages of growth, and in my specimens preserved in alcohol, are not to be seen, although they are to be found in a few young, pressed specimens.

Judging from published figures, *M. Andersonii* is closely related to *Mesogloia gracilis* Kg., Tab. Phyc., viii., Pl. X, which is retained in *Mesogloia* by Agardh. In Alg. Am. Bor. Exs., No. 163, the resemblance to *Mesogloia decipiens*, Suringar, of Japan was noted and, although I have not been able to examine specimens of that species, judging by Suringar's plate,* it still seems to me quite possible that the Japanese and Californian plants may be the same.

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*Lunds Univers. Arsskrift, Vol. xxvii.

DICTYOSIPHON MACOUNII, n. sp., Pl. LXXXVII, fig. 1.

Fronds with an undivided axis, cylindrical-saccate, 2 to 6 inches long, ¼ to ½ inch in diam., tapering at the base, densely clothed throughout with subequal, hollow, fusiform or clavate branches, ½ to 1 inch long, about ⅛ inch in diam. Superficial cells small, 7 μ aver., irregularly polygonal, unilocular sporangia spherical, 38 to 42 μ in diam., scattered irregularly through the substance of the frond, not papillate at the surface.

Grande Vallée River, Gaspe, Quebec, Prof. J. Macoun, Nos. 16, 17, 34.

This species is coarser and stouter than any others of the genus, and the habit in well developed specimens reminds one of large specimens of *Chordaria abietina*, Rupr. In all the specimens in which the base was well preserved the fronds were attached to *Chordaria flagelliformis*, apparently a favorite habitat of species of this genus. The younger plants from one to two inches long were destitute of branches and, in this stage, might be mistaken for small specimens of *Scytosiphon lomentarius*. The habit when fully grown is well shown in Pl. LXXXVII, fig. 1, and the species is not likely to be mistaken for any other *Dictyosiphon* of our coast, for none of them, however much they may vary in size and general appearance, have the inflated axis and short, subequal branches of the present plant, which is less gelatinous than most other species, and in drying does not adhere well to paper.

ECTOCARPUS TOMENTOSOIDES, n. sp., Pl. LXXXVII, fig. 4.

Pulvinately expanded, filaments ¼ inch long, densely interwoven, sparingly and irregularly branched, 6 to 8 μ in diam., cells short, rarely twice as long as broad. Trichosporangia borne in short, very numerous, straight or slightly falcate branches which diverge at right angles from the filaments, sessile, linear, 60 to 80 μ long by 6 to 7 μ broad, generally simple, occasionally pinnate.

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*Musée Bot. de Leide, i, Pl. XXV.

On fronds of *Laminariæ.* Nahant, Mass. Mrs. R. S. Eigenmann.

This species, which forms short and dense patches on old *Laminariæ*, sometimes covering several inches, is evidently closely related to *E. tomentosus*, and it might be questioned whether it is not a young state of that species. Such cannot well be the case, for the specimens on which the species is founded were covered with the very abundant sporangia which indicate maturity. *E. tomentosus* forms characteristic rope-like masses several inches long, whereas the present species is not over a quarter of an inch long, and extends indefinitely over patches of considerable extent. Furthermore the filaments are from a quarter to a third narrower than in *E. tomentosus* and, although the sporangia are much like those of that species in some respects, they are in no instance recurved in the way so common in the sporangia of *E. tomentosus.*

EXPLANATION OF FIGURES.

Plate LXXXVII.

1. *Dictyosiphon Macounii.* Natural size.
2. *Mesogloia Andersonii.* B. Unilocular sporangia. A. Base of hyaline hair. × 500.
3. *Choreocolax Polysiphoniæ*, showing tetraspores. × 500.
4. *Ectocarpus tomentosoides*, showing trichosporangia. × 500.

Plate LXXXVIII.

5, 6, 9, 10, *Glæosiphonia verticillaris.* 9. A plant of natural size; 6. Procarp with trichogyne C, hypogynous cell A, and carpogenic cell B. × 600; 5, a later stage of the carpogenic branch of 6 showing the first divisions of the carpogenic cell B. × 600; 10. Section of a spore-mass attached to carbogenic branch. × 500.

7, 8, *Chrysymenia pseudodichotoma.* 8. Showing tip of stipe and sack-like branches, twice natural size; 7. Section of cystocarp. × 500.

An Enumeration of the Plants Collected by Dr. H. H. Rusby in South America. 1885-1886.—IV.

ANTHOPHYTA.

By N. L. Britton.

GYMNOSPERMÆ.

GNETACEÆ.

Ephedra Americana, Humb. & Bonpl. in Willd., Sp. Pl., iv., 860. Near La Paz, 10,000 ft. (503).

CONIFERÆ.

Podocarpus montana (Willd.), Lodd., Cat. Plants, Ed. 1836, 37. (*Taxus montana*, Willd., Sp. Pl., iv., 857 (1805) ; *P. taxifolia*, H. B. K., Nov. Gen., et Sp. ii., t. 97 (1817).) Yungas, 6,000 ft. (1960).

Podocarpus salicifolia, Kl. & Karst. in Endl., Conif., 209. Mapiri, 10,000 ft. (2463).

Cupressus sempervirens, L., Sp. Pl., 1422. Near Valparaiso, Chili, cultivated. (619).

ANGIOSPERMÆ.

RANUNCULACEÆ.

Thalictrum podocarpum, H. B. K., Nov. Gen. et Sp., v., 38. Sorata, 10,000 ft. (501) ; Unduavi, 8,000 ft. (502).

Anemone decapetala, L., Mant. Pl., 79. Sorata, 13,000 ft., a very slender form. (*A. triternata*, Vahl, Symb. iii., 74.) (1753).

Ranunculus psychrophilus, Wedd., Chlor. And., ii., 300. Unduavi, 8,000 ft. (1354) ; Sorata, 13,000 ft., a small alpine form. (1779).

Ranunculus pilosus, H. B. K., Nov. Gen. et. Sp., v., 45. Sorata 10,000 ft. (510).

Ranunculus brevipes, Triana & Planch., Ann. Sci., Nat., (V.), xvii., 14. (*R. setoso-pilosus*, Steud, in Lechler No. 2709, Herb. Kew.) Near La Paz, 10,000 ft. (1981).

Ranunculus sibbaldioides, H. B. K., Nov. Gen. et Sp., v., 48. Near La Paz, 10,000 ft. (1965).

DILLENIACEÆ.

Davilla elliptica, St. Hil., Fl. Bras. Merid. i., 17. Guanai, 2,000 ft. (865).

Davilla rugosa, Poir., Encyc. Meth. Suppl., ii., 457. Guanai, 2,000 ft. (863.) A smooth form with large acute leaves, the specimens in fruit only, from the junction of the Beni and Madre de Dios Rivers is provisionally referred to this species. (864).

Doliocarpus Rolandri, Gmel., Syst., 805. Falls of Maderia, Brazil. (2495).

ANONACEÆ.

Guatteria pogonopus, Mart., Flor. Bras., xiii., (1), 34. Yungas, 6,000 ft. (1252).

Guatteria eriopoda, DC., Syst. i., 505. Mapiri, 2,500 ft. (1240).

Duguetia Quitarensis, Benth., Lond. Jour. Bot., ii., 361. Junction of the Rivers Beni and Madre de Dios. (1361).

Duguetia ? glabra, spec. nov. Folia oblonga, abrupte acuminata, basi obtusa, glabra. Camaræ in capitulum densissimum congestæ. Flores non vidi. Junction of the Rivers Beni and Madre de Dios. (1378).

This species, if correctly referred to the present genus, differs from all the others I have been able to examine in having the separate fruits connate to very near their beaks, forming a very dense head.

It also diverges from most of the species, in being entirely destitute of lepidote trichomes. The leaves are about 8 inches long by 2 inches wide, and are markedly acuminate.

"This fruit is very fleshy within and edible." H. H. R.

Trigyneia Boliviensis, spec. nov. Folia anguste oblonga, apica acuminata, basi acuta, utrinque glabra, brevissime petiolata. Baccæ oblongæ, 6-10 lin. longæ, 4-5 lin. latæ, stipite 6-9 lin. longæ.

Junction of the Rivers Beni and Madre de Dios. (1253).

Foliage resembling that of *T. Matthewsii*, Benth., Journ. Linn. Soc., v., 69, but fruit very different.

Anona hypoglauca, Mart., Flor. Bras. xiii., (1), 13, ex descriptio. Junction of Rivers Beni and Madre de Dios. (1241).

Xylopia grandiflora, St. Hil., Flor. Bras. Merid., i., 40. Mapiri, 5,000 ft. (1225).

BOCAGEA AROMATICA (Tr. & Planch.) *Oxandra aromatica*, Tr. & Pl., Prodr. Flor. Nova Gran. in Ann. Sci. Nat. (IV.), xvii., 36.

Guanai, 2,000 ft. (2651).

No. 1422 collected at Guanai is of this order, perhaps a *Guatteria*, but the material is insufficient for exact determination.

MENISPERMACEÆ.

Chondodendron tamoides (DC.), Miers, Ann. Nat. Hist., (II), vii., 44. Falls of Maderia, Brazil. (2096.)

Abuta concolor, Pœpp. & Endl., Nov. Gen. et Sp., ii., 64. Falls of Maderia, Brazil. (1980); also a form with leaves acuminate and longer. Guanai. (1979). Common name "Cofferaria."

Cissampelos Pariera, L., Sp. Pl., 1473. Reis, 1,500 ft. (1441). Unduavi, 8,000 ft. (1444).

Var. *Caapeba* (L.), Eichl., in Mart. Flor. Bras., xiii., (1), 190. Falls of Maderia, Brazil. (1442).

Cissampelos sympodialis, Eichl., l. c., 192, var. GRANDIFOLIA n. var. Folia limba 9 cm. longa, 8 cm. lata; petiolis 6 cm. Junction of the Rivers Beni and Madre de Dios. (1443).

BERBERIDEÆ.

Berberis Quindiuensis, H. B. K., Nov. Gen. et. Sp., v., 432. Unduavi, 10,000 ft. 508. Matching a specimen in Herb. Kew. named by Bentham, collected by Bridges in Bolivia.

Berberis rigidifolia, H. B. K., l. c., 431. Near La Paz, 10,000 ft. (1211).

PAPAVERACEÆ.

Bocconia frutescens, L., Sp. Pl., 634. Near Yungas, 6,000 ft. (1162).

Bocconia integrifolia, H. B. K., Nov. Gen. et Sp., i., 119. Yungas, 6,000 ft. (1161).

Eschscholtzia Californica, Cham., in Nees Hort. Berol., 73. Near Valparaiso, Chili. (498), Apparently introduced.

Fumaria officinalis, L., Sp. Pl., 984. Near Valparaiso, Chili, (488). I cannot distinguish the *F. media*, Lois., to which Phillipi refers the Chilian plants. Introduced from Europe.

CRUCIFERÆ.

Cardamine axillaris, Wedd., Ann. Sci. Nat., (V). i., 290. Sorata, 8,000 ft., (2416); Unduavi, 10,000 ft., a small alpine form. (1366).

Cardamine ovata, Benth., Pl. Hattw., 158. Unduavi, 8,000 ft. (1198).

Var. CORYMBOSA, n. var. Siliquis in corymbi conferti. Unduavi, 10.000 ft. (1206). Matching Spruce, No. 5378 from Equador in Herb. Kew.

CARDAMINE SPECIOSA, spec. nov. Caule erecto, 20-30 cm. alte; folia 3 vel 4, pinnata, cum petiolo 7-9 cm. longo; foliola 5-7, oblonga vel ovata, 1-2 cm. longa, 5-10 mm. lata, integerrima vel pauci-dentata; racemis terminalibus 5-7 cm. longis, multifloris; floris 1 cm. longis, atropurpureis; siliquiis erectis, 4-5 cm. longis, linearibus, cum stylis longi-acuminatis; petiolis gracilibus, 12-15 mm. longis. Tota planta glabra.

A most beautiful species, somewhat resembling *C. pratensis*, L., but with very large deep purple flowers. Unduavi, 10,000 ft., in wet places among mosses. (1199).

Sisymbrium gracile, Wedd., l. c., 288. Sorata, 10,000 ft. (1209).

Sisymbrium hispidulum (DC), Tr. & Planch., l. c., A form or variety with leaves merely dentate, not pinnatifid. Sorata, 10,000 ft. (1208). Mandon, 907.

Sisymbrium leptocarpum, Hook. & Arn., Bot. Misc., iii., 139. Near La Paz, 10,000 ft. (1207).

Sisymbrium myriophyllum, H. B. K., in DC., Syst., ii, 477. Near La Paz, 10.000 ft. (1205).

SISYMBRIUM (?) RUSBYI, spec. nov. Elatum; caulibus simplicibus, vel prope ad apicem ramosum, fistulosum, glabrum; folia numerosa, distantia, simplicia, ovata; gracilia petiolata, 5-6 cm. longa, 2-3 cm. lata, utrinque glabra, membranacea, denticulata; racemis 20-30 cm longis; floribus 6 mm. longis, albopurpureis; siliquiis linearibus, 2-4 cm. longis. Sorata, 10,000 ft. (1432): Mandon, 906.

Alyssum maritimum, (L.), Lam., Encyc. Meth., i., 98. Near La Paz, 10,000 ft. (1956). Introduced from Europe.

Capsella Bursa-pastoris (L.), Mœnch, Meth., 271. Near La Paz, 10,000 ft. (1200). Also introduced.

Lepidium bipinnatifidum, Desv., Journ. Bot. iii., 165. Near La Paz, 10,000 ft. (1202); Yungas, 6,000 ft. (1201).

Lepidium Chichicara, Desv., l. c. Near La Paz, 10,000 ft. (1203).

Senebiera didyma (L.), Pers., Syn., ii., 185. Near La Paz, 10,000 ft. (1204).

CREMALOBUS BOLIVIANUS, spec. nov. Erectus, pubescens, 50-80 cm. altus; foliis oppositis ovatis vel ovato-lanceolatis, 5-8 cm. longis, 2 cm. latis, petiolis 5 mm., subter densissime albo-pubescens; racemis laxis, ramosis; siliculis 8 mm. latis, 4 mm. longis, valvis orbicularibus, crenatis. Pedicellis 6-8 mm. longis. Unduavi, 8,000 ft. (1816). The same as Mandon, 905 bis. in Herb. Kew.

Cremalobus, sp. probably related to the last, but entirely smooth; specimens only in flower. Perhaps a distinct species. Near Yungas, 4,000 ft. (1820).

CAPPARIDEÆ.

Cleome gigantea, L., Mant. Pl., 430. A large form with nine leaflets and elongated calyx lobes, extremely glandular-hairy all over, perhaps a distinct species or variety. Yungas, 6,000 ft. (736). Also a very smooth and slender form from Guanai or vicinity. (735).

Cleome glandulosa, R. & P., in DC., Prodr., i., 238. Unduavi, 8,000 ft. (734). The same as Mandon, 937.

Cleome latifolia, Vahl, in DC., Prodr., i., 239. Junction of Beni and Madre de Dios. (737).

Cleome Guianensis, Aubl., Guian., iv., t. 273. Falls of Madeira, Brazil. (1160).

MORISONIA OBLONGIFOLIA, spec. nova. Arbuscula. Folia oblonga, coriacea, 12-20 cm. longa, 7-9 cm. lata, basi obtusa, apici acuta utrinque glabra et reticulata; petiola 6-10 cm. longa; racemi axillares, 3-7 flori; flores 2 cm. lati, pedicelli 1 cm.; baccæ oblongæ, costatæ, papillosæ. Junction of the Rivers Beni and Madre de Dios. (2643 and 2708).

Capparis nitida, R. & P., in DC., Prodr., i., 252. Same locality. (1290, 1291, 1292).

Capparis macrophylla, H. B. K., Nov. Gen. et Sp., v., 91. Falls of Madeira, Brazil. (1293); Junction of Beni and Madre de Dios. (1288, 1289).

Capparis crotonoides, H. B. K., l. c., 95. Unduavi, 8,000 ft. (2637).

VIOLARIÆ.

Viola scandens, Willd., in H. B. K., Nov. Gen. & Sp., v., 371.

Unduavi, 8,000 ft. (1175); Yungas, 6,000 ft. (844); Guanai, 2,000 ft. (845); native name "Chilqua."

Viola veronicæfolia, Planch. & Lind., in Ann. Sci. Nat., IV, xvii., 121. Mapiri, 5,000 ft. (842).

VIOLA BOLIVIANA, spec. nova. Cæspitosa; stolonifera; caule depressa, simplicia, 2-3 cm. alta; folia orbiculares, 2-3 cm. lata, in petiola abrupte contracta, margine crenato-serrata, utrinque glabra; petioli anguste-marginati, 1-2 cm. longi; stipulis fimbriatis, 1-2 cm. longis, 6-8 mm. latis; flores axillares; pedunculi gracili, 2-3 cm. longi, ad medium bibracteolatum; sepalis linearibus, 6 mm. longibus; flores 15 mm. lat., purpureis. Mapiri, 5,000 ft. (843).

Viola Humboldtii, Tr. & Planch., Ann. Sci. Nat,, l. c., var. RENIFOLIA, var. nov. Caules repentes; stipulis ciliatibus, 5 mm. longibus; folia reniformia, mucronato-denticulata. Mapiri, 5,000 ft. (2218).

The same as Mandon, Sorata, No. 943; "in graminosis."

VIOLA BRIDGESII, spec. nova. Caules repentes, graciles; folia reniformia, 15 mm. lata, crenata, glabra; petioli 1 cm. longi; flores axillares; pedunculi gracillimi, 6-7 cm. longi, infra medium bibracteolati; flores 15 mm. longes, calcare brevi, sepalis linearibus, obtusibus. Sorata, 13,000 ft. (841).

This resembles *V. Lechleri*, Griseb., but differs from that species in being entirely smooth and having shorter and obtuse sepals. It is also allied to the last variety enumerated, but its flowers are more than twice as large, and its leaf form very different. Collected first by Bridges, also in Bolivia.

VIOLA THYMIFOLIA, spec. nova. Humilis; caules repentes, 2-6 cm. longes; folia parva, ovata, 3-5 mm. longa, crenulata, glabrata; petioli 2 mm. longi; flores axillares, purpureis, 1 cm. longes, calcare brevissimo, sepalis lanceolatis, obtusibus. Unduavi, 10,000 ft. (1074). A very neat little Alpine species.

Ionidium commune, St. Hil., Pl. Remarques, 295. Mapiri, 2,500 ft. (1365).

Ionidium Sprucei, Eichl., in Mart. Flor. Bras., xiii., (1), 373. Guanai, 2,000 ft. (1364). Falls of Madeira, Brazil (2055.)

Ionidium album, St. Hil., l. c., 303. Falls of Madeira, (846).

ALSODEIA OVALIFOLIA, spec. nova. Ramuli pubescenti. Folia glabra, opposita, 6-10 cm. longa, ovalia, dentata, acuta vel acuminata, basi obtusa; petioli 5 mm. longi; flores anguste

racemosi, (pedunculi 2 mm. longi.), parvi; capsula 10-12 mm. longa, puberula. Junction of the Rivers Beni and Madre de Dios. (1916). Near *A. deflexa*, Benth.

Leonia glycycarpa, Ruiz & Pav., Fl. Peruv., ii., 69. t. 222 (*L. racemosa*, Mart., fide Eichl., l. c., 391) Junction of the Beni and Madre de Dios. (2647).

Sauvagesia erecta, L., Sp. Pl., Ed. II., 294. Mapiri, 5,000 ft. (1076).

BIXINEÆ.

Bixa orellana, L. Sp. Pl. 730. Near Yungas, cultivated. (1310).

Oncoba maynensis (Poepp. & Endl.), Eichl., l. c., 441. (*Mayna paludosa*, Benth.) Junction of Beni and Madre de Dios (1332); Falls of Madeira (1423).

POLYGALEÆ.

Determined by Prof. A. W. BENNETT.

Polygala paniculata, L., Amœn. Acad., v., 402. Near La Paz, 10,000 ft. (1914.)

Polygala violacea, Vahl, Symb. Bot., ii., 79. Near La Paz, 10,000 ft. (1934): Yungas, 6,000 ft. (1915.)

POLYGALA ANDINA, A. W. Bennett, spec. nova. Frutex parvus? Caule ascendente, pubescente; foliis tenuibus, subglabris, lanceolatis, apiculatis, breviter petiolatis; racemis terminalibus; floribus pedicellatis, pedicellis hirsutis; sepalis exteriorbus inæqualibus, ovatis, pubescentibus, ciliatis, superiore majore, concavo; alis magnis, ovatis, glabris, eciliatis, 8mm. longis, 6 mm. latis; corolla alas æquante, vagina basi valde gibbosa; petalis per ⅔ coalitis; petalis superioribus rotundatis. Semina fructusque ignoti. Near La Paz, 10,000 ft. (2869). Near *P. Laureola*.

POLYGALA FORMOSA, A. W. Bennett, spec. nova. Frutex caule glabro vel puberulo; foliis elliptico-lanceolatis, tenuibus, acuminatis (supernis); 8-10 cm. longis, 4 cm. latis, breviter petiolatis; racemis terminalibus, vel axillaribus, laxis, floribus insignibus pedicellatis, pedicellis puberulis; sepalis exterioribus inæqualibus, glabris, eciliatis, superiore concavo; alis grandibus, glabris, eciliatis, inæqualiter ovalibus, 12 mm. longis, 8 mm. latis; corolla ecristata; petalis alas multo superantibus, per ¾ coalitis, glabris; fructo elliptico; seminibus triangularibus, hirsutis, caruncula carnosa præditis, ad dorsum seminis dimidio libera descendente. Mapiri, 5,000 ft. (1908). Related to *P. spectabilis*, of Southern Brazil.

Securidaca volubilis, L., Sp. Pl., 992. Yungas, 6,000 ft. (2544), Guanai, 2,000 ft. (2365).

Monnina parviflora, H. B. K., Nov. Gen. & Sp., v. 419. Yungas, 4,000 ft. (1913 and 1909); Mapiri, 2,500 ft.; specimens referred to this species with some hesitation (1907.)

Monnina cestrifolia, H. B. R., l.c., 413; Mapiri, 5,000 ft. (1912). Collected also by R. Pearce in the same region (728 in Herb. Kew).

MONNINA BOLIVIENSIS, A. W. Bennett, spec. nova. Frutex grandis? Ramis validis crassis pubescentibus; foliis crassis ellipticis vel ovatis (supernis), 10 cm. longis, 6-7 cm. latis, nervo medio subtus valde prominente, breviter petiolatis, petiolo ad basim articulato; petiolo nervoque medio pubescentibus; paniculis terminalibus ramosissimus, confertis, ramulis ad basim articulatis; bracteis linearibus hirsutis subpersistentibus; floribus sessilibus cœruleis in alabastro fere rotundis, 4 mm. latis et longis; sepalis 3 exteriorbus subæqualibus, ovatis, ciliatis, margine cœruleis; alis subrotundis, glabris, eciliatis; carina et petalis lateralibus glabris, eciliatis; fructu sessili, triangulari, 3 mm. longo, 2 mm. lato; glabro et vix rugoso; monospermo, seminibus maturis non visis. Near Yungas, 4,000 ft. (1970). Related to *M. æstuans*, (L.), DC., and *M. Xalapensis*, Kunth.

Monnina rupestris, H. B. K., l. c., 415. Sorata, 10,000 ft. (1910); Unduavi, 8,000 ft. (1911).

Monnina resedoides, St. Hil., Flor. Bras. Mer., ii., 61. Near La Paz, 10,000 ft. (1932 and 1933). Specimens also from near Yungas, 4,000 ft. perhaps this species, perhaps *M. Chandruyensis*, Spruce, ms.

Monnina, (?) Beni River (1538). A mere scrap wlth the flowers not developed; not seen by Professor Bennett.

VOCHYSIACEÆ.

Vochysia divergens, Pohl, Pl. Bras., ii., 19, t, III. Mapiri, 2,500 ft. (610). Specimens referred to this species with some hesitation.

Trigonia pubescens, Camb. in St. Hil., Fl. Bras., ii., 114. Guanai, 2,000 ft. (2450, fl., 2596, fr.)

Trigonia parviflora, Benth., Kew Journ., iii., 163. Guanai, 2,000 ft. (2449, fl.); Mapiri, 5,000 ft. (1220, fr.)

Additions to Our Native Flora.

Geum album, Gmelin, var. FLAVUM, n. var.—More slender; flowers smaller, petals narrower and oblong, about half the length of the calyx-lobes, yellow.—In Eastern Pennsylvania and New Jersey, often growing with the typical form, but scarcer.

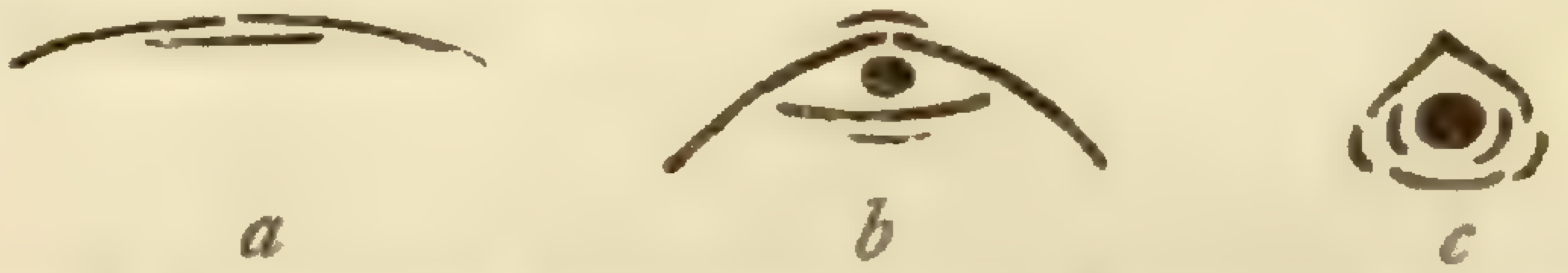
Gaylussacia resinosa (Ait.), T. and G., var. LEUCOCARPA, n. var.—Berries softer, white or cream-color. Specimens in alcohol semi-translucent.—Warrior's Ridge, Huntingdon Co., Pa., 1858. East Knob, Pike Co., where, in 1886, twenty bushels of the fruit were gathered and sold for almost three times the price of the ordinary kind. Also reported as found in northern New Jersey.

Bœhmeria cylindrica, Willd., var. SCABRA, n. var.—Erect, strict, 2 feet high; leaves thick and rigid, very rough on the upper surface, tomentose beneath, on short petioles or almost sessile usually reflexed and pressed against the stem; spikes densely flowered, much longer than the petioles.

In bogs, Crawford and Lancaster counties, Penn., and at Budd's Lake, Morris Co., N. J. THOS. C. PORTER.

Botanical Notes.

Bulblets of Lycopodium lucidulum. In addition to my note last month, on the "bulblets" of *Lycopodium lucidulum*, Michx., I may remark that they seem to be by no means so rare as might have been expected from their having so generally escaped the notice of botanists. The persistent stipes were readily detected on specimens in the Columbia College herbarium. An esteemed correspondent in West Medford, Mass., writes that she found the bulblets without the slightest trouble on plants of this species under cultivation, and also on New Hampshire specimens collected last season. On a thrifty plant gathered near West Medford December 8th, some of the "bulblets" still remained. This specimen differed in one very interesting and important respect from those collected in Western New York. Sporangia as well as "bulblets" were plentifully produced on the latter, and the empty valves of several successive years were conspicuously persistent. In the West Medford plant not a single sporangium of this or any previous season was discoverable. In other words, the auxiliary reproductive process seemed in this particular instance to have altogether supplanted the normal method characteristic of the genus. In general structure the West Medford "bulblets" are substantially the same as those from Chautauqua. The stipes are shorter, however, barely a line in length: the upper bract of the antero-posterior pair is smaller, triangular lanceolate and taper-pointed, (instead of "oblong and obtuse"): the two main scales of the "bulblet" tend to diverge towards the extremity, thus producing a V-shaped opening between them (instead of a mere tiny "notch"). The accompanying diagrams are based on the specimens from Western New York. To represent the West Medford "bulblet" exactly, the uppermost bract in *a* should be narrower, and the interval between the two lower scales in *c* should be greater.



Diagrams of *Lycopodium lucidulum*, × 6. Bracts at the summit of the stipe (*a*), and "bulblet" near the base (*b*) and towards the apex (*c*).

Dianthus Armeria, L., flowers ordinarily in July and August. Some eight or ten blossoms which I collected last October, on the Harlem bank of New York Island, were, therefore, greatly belated. The first one I found was of a darker purple than usual, and the white dots in the centre of the flower were wholly wanting. This peculiarity was so marked as to attract my attention at the first glance, and I made a diligent search for other specimens with the special object of seeing whether or not it would be repeated. Four or five different plants, averaging two flowers each, were found at different points, and in every instance the white dots had disappeared and the petals were of a decidedly intensified purple. This interesting chromatic variation appears to be due to the lower temperature of October as compared with that of August, inasmuch as the numerous flowers collected at the same station during midsummer were all strictly normal in coloration. E. E. STERNS.

Willow-galls. E. E. S., in the last BULLETIN, suggests that gall-bearing by willows may possibly represent "a result of insect action become hereditary," and this most unreasonable conjecture is put forth on the slight negative evidence that "the writer had repeatedly opened these cones without being able to find any larvæ or other indication of insect agency." Clearly E. E. S. is a botanist and not an entomologist! Mr. Walsh, in the Proceedings of the Entomological Society of Philadelphia, 1864, states that in the cabbage-like gall which infests *Salix longifolia* there dwell the *Cecidomyia* which is the maker of the gall, and altogether about two dozen other species of insects, which he enumerates, and which are more or less dependent upon the gall-maker for their existence! In the cones which appear to have more particularly attracted the attention of E. E. S., the larvæ of the gall-maker, a species of *Cecidomyia*, inhabits the very heart or center of the cone. Mr. Walsh says that "out of twenty galls opened November 15, all contained the cocoon. The first imago appeared April 5 and the last May 10." In addition to the true gall-maker the larvæ of another gall-gnat "live in great numbers under the scales," and, furthermore, the eggs of a meadow-grasshopper are often found under the scales—as many as fifty to one hundred in a single cone.

At least twenty distinct galls are known to occur on the willows of the States east of the Mississippi. These have been elaborately described, and the habits of the insects producing them carefully studied. If our entomological brethren have encountered any difficulty in the investigation of these galls, it has arisen not from the absence of "indications of insect agency" in their production, but rather from the difficulty of discerning the true gall-maker when found in the midst of so many gall-guests.
M. S. B.

Weeds. Professor Halsted, late of the Agricultural College, Ames, Iowa, who has recently come to New Brunswick, N. J., is evidently in the midst of weeds, for he writes us concerning the flora of the vicinity of New York and especially the ballast plants, and hints that he would like a note in the BULLETIN, stating that he desires a report of the twenty worst weeds in any locality. The injuriousness and range of our native and introduced weeds can be determined only by the combined reports of many careful observers, and we trust our readers in all parts of the country will aid in this important work. It is suggested that the easiest method of making such a report is by checking off the species in a local County or State printed list, giving as many common names for each species as are in use in the locality. Particular attention should be given to any recent weeds, and any successful means of eradication should be stated.—[Ed.]

Oxybaphus nyctagineus has established itself along one of the railroads leading into Providence, R. I., as I am informed by Mr. Arnold Green. W. W. BAILEY.

Variegated Kalmia. I think variations are interesting and should be put upon record. I therefore send you a specimen of *Kalmia angustifolia*, with variegated leaf. This variety occurs in two places in the town of Dartmouth, Mass., and in quite sizable clumps; hence it is not an individual sprout.

E. LEWIS STURTEVANT.

[Our attention was called to the same occurrence in *K. latifolia* some years ago by Dr. J. B. Potter, at Bridgeton, N. J.—Ed.]

A Trifid style in Mentha piperita. I enclose flower of *Mentha piperita* with a polemoniaceous style. The bifid character is so strongly marked in the order that the indications of a possible tri-carpellary structure may have an evolutionary value.

T. MEEHAN.

Eclipta procumbens. It must have been noted, but probably not recorded, as it deserves to be, that on plucking portions of *Eclipta procumbens*, the bruised tissue assumes an inky black hue.

T. MEEHAN.

A new Foreigner. Specimens of the great European pest, *Cuscuta Epithymum*, Murray, var. *vulgaris*, Engelm, (*C. Trifolii*, Babington), have been sent me from Seidersville, Northampton Co., Pa., by Mr. Robert G. Bechdolt, who says it is making sad havoc in the clover fields of his neighborhood. Mr. B. has collected also, at the same station, *Leontodon hirsutus*, L., *L. autumnale*, L., *Picris hieracioides*, L. and *Lactuca Scariola*, L.

THOS. C. PORTER.

Botanical Clubs seem to have taken a start of late. It is a good and encouraging sign, and speaks more plainly than anything else of the spread of botanical interest in recent years. The May's Landing Botanical Club, under the Presidency of Rev. Dr. J. E. Peters, has recently been organized in New Jersey.

Reviews of Foreign Literature.

In a Dissertation by Paul Hauptfleisch, Greifswald, 1888, *on the Cell-membrane and gelatinous Envelope of the Desmids*, the author states that with the exception of *Spirotaenia*, which does not properly belong to the Desmids, the cell-membrane of the entire family consists of two separate pieces, the thin edges of which overlap each other in a similar manner to the membrane pieces of the Diatoms. Many species of *Closterium* and *Penium* correspond still more closely to the Diatoms by having the so-called shells and girdle bands of the latter. When the cells divide a new cylindrical membrane is first formed under the place of meeting of the two pieces of the old, and when the two halves are shoved apart, the new membrane is thus exposed, after which a cross portion divides it in two cells. The completed membrane is in most cases provided with small pores; extending through these are fine protoplasmic threads, which terminate on the outside in small head-like expansions. The gelatinous covering of the membrane consists of separate portions covering certain parts, and these portions are composed of prismatic bodies fitting closely into each other.

Although no clear exposition of the functions of these pores, nor of their relation to the rest of the plant, is given by the author, he states emphatically that the exudation of gelatinous substance takes place through them and that they are not formed till the membrane is otherwise perfect. E. L. G.

The so-called Spermatia of the Ascomycetes. By Alfred Moeller. (Bot. Zeitung, July 6th, 1888.)

This is the subject of a brief article in reference to certain criticisms on a previous article, "The Culture of Lichen building Ascomycetes without Algæ," in which the author has given strong evidence in favor of the conidial nature of the supposed spermatia of the ascomycetes. In the article in the Bot. Zeitung, he sums up the evidence in favor of the theory of the sexual nature of the spermatia, and then the evidence on the other side, and states that there is no longer any reasonable ground for the assumption of the sexual function of these organs.

The arguments for and against this theory are as follows:

When Stahl published his work on "The Sexual Reproduction of the Collemaceæ," no one was able to refute the assumption that the office of the spermatia was that of fertilization. But it is quite as evident that in all the investigations made by Stahl, he was unable to bring forward any direct proof of this assumption. This latter fact was first clearly stated by Brefeld in his work on "Schimmelpilze." Now Moeller states that this last mentioned criticism holds also in reference to the two other cases generally cited in connection with that of the Collemaceæ, viz.: What is given by Fisher and Frank in reference to *Polystigma* and *Gnomonia*. These three instances, he says, are the only ones brought forward by the advocates of the sexual nature of the spermatia of the ascomycetes. Opposed to this view of the subject is a long list of facts which may be briefly stated as follows:

Already in 1876, shortly before the appearance of Stahl's work on the Collemaceæ, Cornu had discovered that in case of several kinds of the spermatia in question, they began to germinate and develop into a mycelium, when offered the proper nourishment. Against this evidence of the conidial nature of the spermatia critics at once decided this to be only an abnormal development of a sexual organ whose real function was turned aside by external causes, and they gave as an analogous case the germination of the pollen grain in a sugar solution.

Next appeared Krabbe's investigations, published both in the Bot. Zeitung and in the Berichte des Deutschen Gesellschaft zu Berlin. These had special reference to the lichens. From this work it appears that the spermatia produced by *Cladonia* cannot be considered sexual organs, because the development of the apothecia is shown to be independent of any participation on the part of the spermatia. To evade this evidence of their non-sexual character, the opponents of this theory had recourse to the assumption of apogamy, this being the only possible explanation left them.

Next, the author speaks of the objections raised as to the results of his own work, although he succeeded in bringing the so-called spermatia, not only to germination, but to thallus-forming and fruit-bearing, still the believers in the sexual function declare this may be explained on the ground of the prevention of sexual activity. They cite as analogous cases, the swarm spores of *Ectocarpus.* The author says that the facts in reference to these swarm spores are no more relevant to the case in question, the analogy, therefore, no closer, than in the comparison of the spermatia about which Cornu writes, with the pollen grain of the phanerogams. He says the organs are entirely different and the plants to which they belong are very far from sustaining a close relation to each other; what is to be gained, therefore, by comparing the development of a naked, ciliated swarm-spore with the conidia of the ascomycetes which cluster about the twelve celled trichogyne?

As the last and most conclusive evidence against the sexual theory, he gives what is found in the latest edition of Brefeld's "Schimmelpilze," (Heft. vii, p. 57). Here it is claimed that what was formerly looked upon as an unexplainable riddle, viz.: Ascus fruit without the intervention of a sexual act, is clearly the natural course of one method of a sexual reproduction, the highest member of which is the sporangium fruit. As proof of this conclusion Brefeld says that during the winter preceding the publication of his work, more than one hundred forms of spermatia, chosen at random from many kinds of ascomycetes, were brought to germination and development. Added to this were many cases of new forms of spermatia never before tested.

Contrasting the facts for and against the sexual theory, the author says there can no longer be the least doubt existing. In three cases, by a somewhat circuitous method of reasoning, the probability of the sexual nature of the organ was established. In none of these instances was it shown that the spermatia united with the trichogyne. Add to this the improbability of the fertilizing matter of the tiny spermatium being able to make its way, as sometimes it must, through twenty-four trichogyne cells before it can effect fertilization, and the evidence is very much weakened. All the spermatia which have been subjected to careful treatment have shown their ability to germinate and develop. Careful experiments have shown that the ascus fruit can be asexually produced without the aid of the spermatia, and finally it may be said, it has been clearly proven that the ascus fruit in general originates asexually. Notwithstanding all this the author complains of the exceeding obstinacy of those who still bring forward the old argument and explain by bringing in apogamy and such far-fetched analogies as the swarm-spores of *Ectocarpus.*

For the benefit of those who still hold fast to the one strong point in favor of the sexual theory, viz.: the facts in case of *Collema microphyllum,* he adds a single fact, which is that spermatia of this plant, after lying one month in prepared food solution, began to show signs of germination; after two and three months they had thrown out tiny tubes in two or three directions, and not till after the fourth month did the tubes reach the stage of branching. It is therefore, the opinion of the author that when the various kinds of lichen conidia (spermatia) have been studied so as to allow of their arrangement in a series whose members show a constantly decreasing power of intensity of growth, those of *Collema* will stand at the end of this series, as up to the present time they show the slowest growth of any forms investigated.

E. L. G.

Culture of Lichen-building Ascomycetes without Algæ: By Alfred Moeller, and *Germination of Lichen-spores on Moss-protonema and on Algæ which are not like the Gonidia of the Lichens:* By Gaston Bonnier.

In the Naturwissenschaftliche Rundschau of October 27 both of these articles are reviewed, and the results of the experiments given. The reviewer begins by stating that the so-called Schwendenerish theory, as elucidated by him about 20 years ago, in regard to the double nature of Lichens, for the majority of botanists had passed out of the stage of theory into that of scientific certainty, but that quite recently some few Lichenologists, Stein, Nylander and others, had placed themselves on the opposite side of the question.

The theory can be proven either by synthesis or analysis. The former method has been tried successfully by Rees, Treub and Stahl, and still more recently by Bonnier, that is, the Lichen-thallus has been raised by uniting fungus-hyphæ and certain Algæ forms. By the analytical method it must be proven that the green part of the lichen, the so-called gonidia, are identical with certain forms of algæ, which Schwendener very successfully accomplished. But as other investigators, Famintzin and Baranetzky, proved that the gonidia of many lichens were able to carry on an independent existence, while entirely disconnected from the hyphæ of the lichens, this fact was not taken as evidence of the truth of Schwendener's theory, even by the discovers themselves, and it was maintained that these were not algæ but only free lichen-gonidia. The Lichenologists held firm to the idea that it was possible for the gonidia to take their origin from the lichen-hyphæ. In order to break down this idea, there was only one method to be used, (which he calls the second form of the analytic method) that was to cultivate the lichen-building fungus and bring this to a reproductive stage, as has already been done with the algæ. Lichen spores must be sown where no algæ could get an entrance. These spores of lichens are developed in a fruit form which corresponds to that produced by other fungi. Until the experiments of Moeller, however, all attempts to bring the lichen spores to a full development had failed; they would germinate and grow for a short time, and then die without producing fruit. Moeller succeeded in bringing the spore to develop into a lichen thallus, and this to produce spores* No gonidia were formed in the whole course of development. The lichens thus cultivated were, *Lecanora*, *Lecidea*, *Graphis*, *Calycium* and *Verrucaria.* In the case of *Calycium* several places in the spore sent out little mycelium tubes, out of which was built, in about four weeks time, a thallus 2 centimetres long and over 1 broad. This thallus developed spermagonia in which were produced spermatia according to the generally received opinion about the various fruit forms of the lichens. These spermatia, however, on being sown on a proper medium, germinated and produced a thallus. From this fact Moeller decided that they are not fertilizing organs, as they have hitherto been regarded, but only another form of conidia, or asexually produced spores. He names them Pycnoconidia. These experiments seem to have taken away the last fragment of support for the theory of a genetic connection between the algæ and fungi of the lichens. It is still desirable that cultivation be carried farther, until, if possible, ascus fruit is produced from the thallus.

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* Untersuchungen aus den botanischen Institut der königl. Akademie Münster i. w., 1887.

Bonnier had noticed that moss protonema was attacked by some kind of fungus, and it occurred to him that the lichen-building fungus might be brought to use another host if the proper alga forms were not to be obtained. He therefore cultivated moss protenema on sterilized sand, in an apparatus arranged so that no germs were allowed to enter from the air. In this way he raised several mosses, *Hypnum cupressiforme*, *Barbula muralis*, *Funaria hygrometrica*, *Mnium hornum*, *Dicranella varia* and *Phascum cuspidatum.* On these developed cultures he then sowed the lichen spores. In other cases he sowed lichen and moss spores at the same time. He was able to follow the growth of these spores, some of them, under the microscope; saw the protenema of the moss seized by the growing lichen spore and gradually invested with it in the same manner as observed in the case of filamentous algæ. These hyphæ, branching and anastomosing, finally built an elegant network about the moss-protonema.

Bonnier then tried to substitute other algæ forms in lichens having only a certain kind. He placed the germinating lichen spores in the presence of the foreign algæ, but in, most cases, failed to produce a thallus. Twice in case of *Parmelia parietina* however, he succeeded. The normal alga of this lichen is *Protococcus viridis* and he obtained lichens with *Protococcus botryoides*, and what is still more conclusive, with an alga of quite different form, namely, *Trentepohlia abietina*, a reddish filamentous alga.
E. L. G.

Index to Recent American Botanical Literature.

Acrostichum Hartii, *Baker*, n. sp.—J. G. Baker. (Journ. Bot., xxvi., 371). Description of a new species from Trinidad, named for the collector, Mr. John Hart.

Andropogon—Notes on.—F. Lamson Scribner. (Bot. Gazette, xiii., 294–296.)

Berberis Fendleri.—Sereno Watson. (Garden and Forest, i., 460, fig. 72.)

Berberis Fremonti.—Sereno Watson. (Garden and Forest, i., 496, fig. 77.)

Black Rot. (*Læstadia Bidwellii.*) F. Lamson Scribner and Pierre Viala. (U. S. Dept. Agric., Botanical Division, Bull. No. 7, pp. 29, Washington, 1888.)

A report of observations made during 1887 on the ravages of this pest of the grape; portions of it have been already published in French by Prof. Viala, under the title "Le Black Rot in Amerique," and to these are added the results of successful experiments on the treatment of the disease during the past season. There is a very interesting chapter on the origin and history of the malady. The fungus causing it is native to East America, and is found on most of the wild vines. Its oldest specific name is *uvicola*, Berkeley and Curtis, who placed it in the genus *Phoma*. Mr. Ellis first described the perithecial stage as *Sphæria Bidwellii.* There have been a variety of other names applied to it, and now Prof. Scribner tells us that "a minute study of the perithecia, both in America and France, has caused us to classify the fungus in the genus *Læstadia.* The only specific name which now ought to be given it is *Læstadia Bidwellii.*" Now we are quite willing that mycologists should decide whether or no the name given the original imperfect form should stand, but inasmuch as Kunth applied the generic name *Læstadia* to a genus of Andean Compositæ as early as 1833, while as applied by Auerswald to fungi it dates from only 1869, we would submit that the binomial accepted by Profs. Viala and Scribner cannot stand under any circumstances.

Botanic Garden for the City of New York.—C. S. Sargent. (Garden and Forest, i., 517, 518.)

Professor Sargent ably states the advantages of a great botanical garden to the city of New York and to botanical science, and indicates the lines upon which such an establishment should be administered, the elements available for its foundation, and the needs of such an undertaking.

Botany at the University of Gottingen.—W. E. Stone. (Bot. Gazette, xiii., 287–294.)

Botany for Academies and Colleges, consisting of Plant Develop-

ment and Structure from Seaweed to Clematis, and a Manual of Plants, including all the Known Orders with their representative Genera.—Annie Chambers-Ketchum. (Small 8vo., pp. 190 and 192, Philadelphia, 1889.)

The plan of this new book follows the Jussieuian method, beginning with the consideration of the most lowly plants and leading up to that of the Anthophyta. The terminology adopted for the lower groups is antique. We were not prepared to see the names Thallogens and Acrogens—the latter here including both the moss tribe and the fern alliance—used again, and can but regret that they have been employed by Mrs. Chambers-Ketchum. The book is thoroughly illustrated, many of the cuts being taken from original drawings. There are chapters on the past history of plants, on plant chemistry, on the several systems of classification, and on nomenclature and pronunciation The tables of what are called Etymons, giving both the derivations of common words and those of proper names, are very useful. The "Manual of Plants" composing the second part of the book, contains an immense amount of information in a very small space.

Chekan. (*Eugenia Chequen, Mol.*) H. H. Rusby. (Druggists' Bulletin, Nov., 1888, with cut. Reprinted.)

Compositæ in Medicine.—H. H. Rusby. (Pharm. Rec., Dec. 1, 1888. Reprinted.)

A brief consideration of the chief medicinal species, compiled with special reference to the want of uniformity which exists in the constituents and properties of this natural order.

Cork-wings on certain trees.—Development of.—Emily L. Gregory. (Bot. Gazette, xiii., 249–258, 281–287, 312-317; two plates.)

Diatomaceous formations of Virginia in connection with some recent discoveries made in the excavation of the Eighth Street tunnel at Richmond.—C. L. Peticolas. (The Microscope, viii., 327–330.

A description of the location and extent of these world-renowned deposits, with some conclusions regarding their geological position. As might be expected, the paper is one of considerable interest, for the author has enjoyed special advantages for the study of these formations. C. H. K.

Diatoms and other Algæ of New Haven Harbor and adjacent Waters.—Wm. A. Terry. (Amer. Month. Micros. Journ., ix., 225–227.)

An interesting contribution to our knowledge of the diatomaceæ of Long Island Sound. It is to be hoped that the author will continue his researches and follow this paper with a complete catalogue of species. C. H. K.

Diœcism in Andropogon provincialis.—A. A. Crozier. (Bot. Gazette, xiii., 302.)

Flora of the vicinity of San Francisco.—By H. H. Behr, M.D., Prof. of Botany in the California College of Pharmacy.

Want of originality is a fault which certainly can never be charged against the author of this book. A Linnæan key to the generi contrasts strangely enough with the most modern ideas in the treatment of some portions of his subject. We note particularly the brief diagnostic descriptions of species which render it possible to produce a convenient little hand-book. With all its faults of arrangement, the work must be found a great convenience to those who wish to carry their key into the field with them. H. H. R.

Fossil Plants—Evidence of the, as to the age of the Potomac Formation.—Lester F. Ward. (Amer. Jour. Sci., xxxvi., 119–131.

Fungi which kill insects.—Otto Lugger. (Exp. Sta. University of Minnesota, Bull. No. 4, 26–41, nine figures.)

Grönland's Vegetation.—Eug. Warming. (Engler's Bot. Jahr., x., 364-409.) An exhaustive account of the character and distribution of the Flora of Greenland.

Guatemala.—Undescribed plants from.—John Donnell Smith. (Bot. Gazette, xiii., 299, 300; two plates.) *Hanburia parviflora* and *Calea trichotoma* are described.

Heather in Townsend, Mass.—George L. Goodale. (Amer. Journ. Sci., xxxvi., 295–296.) Another locality for *Calluna vulgaris* is reported, discovered by Mr. Ralph Ball. Dr. Goodale presents conclusive evidence that it was introduced from Europe some twenty years ago.

History of Garden Vegetables.—E. Lewis Sturtevant. (Amer. Nat., xxii., 979–987; continued.) Kohl-rabi (*Brassica oleracea, caulo-rapa*), Lavender (*Lavendula vera*), Leek (*Allium Porrum*), Lentil (*Ervum Lens*) and Lettuce in its various forms (*Lactuca sativa*), are here discussed.

Introduction to Entomology.—Part I.—John Henry Comstock. (8 vo., pp., 234, Ithaca, 1888.)

The study of insect life is so closely associated with certain branches of botany that mention of this new work will not be considered out of place. It is both structural and systematic, the first two chapters being devoted to an exposition of the characters, metamophoses and anatomy of insects. The remainder of the book contains descriptions of families and orders, the determinations being aided by analytical keys, similar to those used with such advantage in our botanies. Mrs. Comstock has contributed much to the value of the work in drawing and engraving most of the illustrations from original material.

List of plants found growing wild within thirty miles of Amherst. N. A. Cobb. (Pamph., 8vo., pp. 51, 1887).

Although published nearly two years ago, this local catalogue has only recently come to our notice. It is an extension of Prof. Tuckerman's list of the same region, published in 1875, and includes representatives of all the sub-kingdoms, a goodly number of Protophyta being recorded. Localities are given for the scarcer flowering plants and ferns, but the lower classes are merely enumerated.

Michigan Agricultural College—First Annual Report of the Department of Botany and Forestry. W. J. Beal. (Pamph., pp. 25, Agricultural College, 1888.)

Besides the records of work accomplished at the Experiment Station and its outlying farms, Professor Beal contributes chapters on the Flora of Northern Michigan, on that of the "Jack-pine Plains," and comparisons of the Michigan Flora on the east and west sides of the State, in latitude 44° 40′.

Œnothera albicaulis. F. W. Anderson. (Bot. Gazette, xiii., 300,301.)

Mr. Anderson records the offensive odor emanating from the flowers of this species.

Pentstemon rotundifolius. Sereno Watson. (Garden and Forest, i., 472, fig. 73.) C. G. Pringle. (l. c., 496.)

Pharmaceutical Habitat Map of France. P. W. Bedford. (Pharm. Rec., Dec. 15, 1888.)

This is one of the most carefully prepared and instructive things of its kind that we have seen. Its practical value is enhanced by an alphabetical descriptive index on p. 393. Unfortunately there are quite a number of typographical errors.

H. H. R.

Primula Rusbyi, Greene. J. D. Hooker. (Bot. Mag. t. 7,032.)

Comparing this species with *P. Parryi*, Sir Joseph Hooker remarks that judging from dried specimens and the figure before us, the flowers are not, as stated by Mr. Greene, so large nor brightly colored as those of the latter species. While this is unquestionably true, yet the discrepancy is not so great as would seem from this figure. The plant appears, like so many of our Primulaceæ, to vary considerably. The figure displays a plant taller and more slender, and with more numerous and narrower flowers, the color less vivid and the eye less prominent, than in the specimens that I collected in the Mogollon Mountains. Of these specimens Mr. Greene received the largest and showiest. It is clear that neither the plants collected by Mr. Pringle, nor those of Mr. Lemmon, had such well developed flowers as those of the type. There are other characters besides the size of the flowers which make Parry's species more attractive in its native habitat. It grows three or four times as tall, and in masses or rows among the rocks, these presenting patches of brilliant bloom. On Mt. Humphreys, where I collected it July 3, 1883, I was obliged to dig through several inches of snow to secure the roots. The *P. Rusbyi*, on the other hand, grows scattered over rich lightly wooded hill-sides, and is a much less luxuriant grower.

H. H. R.

Protococcus—An elementary Study in Biology. Henry L. Osborn. (Amer. Month. Micros. Journ., ix., 183-186, fourteen figures.

Quercus virens.—The Live Oak. C. S. Sargent. (Garden and Forest, i., 476, fig. 74.)

Report of the Botanist New York State Museum of Natural History. Chas H. Peck. (41st Ann. Rep. Trustees, 1887, pp. 51-122; four illustrations.)

Mr. Peck's present report contains much information of interest and value not alone to New York botanists, but to all. Enumeration is made of twenty-six species of flowering plants not before recorded as growing within the State, most of them introduced, but including *Aster junceus; Salix amygdaloides; Potamogeton Zizii; P. Hillii: Panicum nervosum; Deyeuxia Porteri* and *Eatoina Dudleyi*, all detected in the Western counties by Professor Dudley. Besides these, there are a great number of Fungi, fifty-two of them described as new, all collected by the indefatigable State botanist himself, mainly in the Adirondack region. Mr. P. H. Dudley contributes one of his important articles on fungi destructive to timber. Not the least valuable chapter is an index to the species mentioned in the Museum Reports Nos. 22 to 38. The growth of the herbarium at Albany is evidenced by the statement that specimens of 170 species were added during 1887, of which number 105 were previously unrepresented.

Rhætic Plants from Honduras. J. S. Newberry. (Amer. Journ. Sci., xxxvi., 342-351; one plate.)

Rubiaceen Südamerikas.—Ueber einige verkannte oder wenig gekannte Geschlechte der. Karl Schumann. (Engler's Bot. Jahrsb., x., 302-363.)

A long discussion of the limitations and relations of a large number of genera in Rubiaceæ.

Scale-Flowers. (*Mutisia viciæfolia, Cav.*) H. H. Rusby. (Druggists' Bulletin, Dec. 1888, with cut.)

Shortia.—The story of. C. S. Sargent. (Garden and Forest, i., 506, fig. 80.)

Strassburg and its Botanical Laboratory. Wm. R. Dudley. (Bot. Gazette. xiii., 305-311.)

Synopsis of the Medical Botany of the United States. J. M. G. Carter, A.M., M.D., etc. (Geo. H. Field, St. Louis, Mo.)

This work on Medical Botany, which is very complete in its way, is rather historical than practical or scientific. No attempt is made to fix upon the real value of the plants in medicine, the names of the species and varieties—to the number of 1300—being given in botanical sequence, and having appended a list of the properties which have at one time or another been credited to them. As a result we have an excellent record of the popular estimate, past and present, of our North American plants, but little that could guide any one, except to certain failure, in their use. Thus we find ascribed to Hepatica astringent, hepatic, pectoral, demulcent, deobstruent and tonic properties; and yet its reputation in hepatic disorders is antiquated, having arisen solely from the fancied resemblance of its appearance to that of the liver, and it is now considered by all scientific authorities as being nearly inert. To nine genera in Caryophyllaceæ are ascribed important actions while in reality that family is the type of inertness. We miss from the list of consulted works given in the preface, the name of that one that would have been of most value to our author, the Medical Botany of North America, by Dr. Laurence Johnson. That work, which we have, however, always held to be too conservative, represents more nearly the modern estimate of our vegetable drugs, and challenges a majority of the statements as to medicinal activity made in the pages of the book before us. H. H. R.

Uromyces Trifolii. Lucien W. Underwood. (Bot. Gazette, xiii., 301, 302.)

Proceedings of the Club.

The regular monthly meeting was held Tuesday evening, December 11, 1888, the President in the chair and 20 persons present.

Mr. Sterns, Chairman of the Committee appointed at the last meeting to consider the matter of the proposed Botanic Garden, presented a report, which was accepted, and the Committee was enlarged to eight members.

The amendment to the Constitution proposed at the November meeting, increasing the annual dues from two dollars to four dollars and including all the publications of the Club, was unanimously adopted. A paper by Dr. Thos. Morong, on "First Glimpses of South American Vegetation," was read by the Secretary.

The desirability of increasing the scope of the Club's publications was discussed, and authority was given the editors to inaugurate a new series to be called "MEMOIRS," and to contain papers too long for printing in the BULLETIN.

At the adjourned meeting of December 26th the Vice-President was in the chair and 27 persons present.

Mr. S. A. Briggs, Mr. E. A. Congdon, Miss Lena Rowley, Miss Irene Halsted, Miss Louie R. Heller and Miss Helena D. Leaming were elected Active Members.

Prof. Joshua Paul of Salt Lake City, Utah, was elected a Corresponding Member.

Mr. Van Brunt read a paper on "The Flora of the Higher Catskills."

A collection of plants made by Rev. Dr. Chas. H. Hall in the Yellowstone National Park in June, 1888, was shown and commented upon by Dr. Britton. Among them were the following species not recorded in Mr. Frank Tweedy's Catalogue:

Ranunculus alismæfolius, Geyer; *Camelina sativa* (L.), Crantz; *Polygala paucifolia*, Willd., apparently not before reported from the Rocky Mountain region and possibly not collected quite within the confines of the park, but certainly very near to them; *Dodecatheon Jeffreyi*, Moore, var. *alpinum*, Gray; *Hydrophyllum capitatum*, Dougl.; *Mertensia oblongifolia*, Don; *Lithospermum angustifolium*, Michx.; *L. pilosum*, Nutt.; *Echinospermum deflexum*, Lehm.; *Oxybaphus nyctagineus*, Sweet; *Polygonum ramosissimum*, Michx., and *Carex Hoodii*, Boott.

Dr. Hall gave an interesting account of his trip and of the circumstances under which the plants were collected.

Miss McCabe exhibited a bifurcated frond of *Aspidium acrostichoides*, gathered from a plant which had produced similar fronds for the past seven years; also specimens of *Aster linariifolius* in which the extremities of all the rays were laciniate.

Miss Clark showed *Polygonum articulatum* and *Pogonia trianthophorus* gathered at Intervale, N. H., on the eastern slope of the White Mountains.

BULLETIN

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White Mountain Willows.—II.

By M. S. Bebb.

Salix phylicifolia, L. Carey, Gray's Man., Ed. 2. *S. chlorophylla*, And., Gray's Man. Ed. 5, excl. char. *S. chlorophylla*, var. *denudata*, And., DC. Prod.

This has been considered the rarest species of the little group of Alpine Willows found on the White Mountains, and certainly specimens available for study in even the largest herbaria of the country have been very meagre and unsatisfactory. We read, therefore, with surprise Mr. Faxon's statement that it is " probably more widely diffused than *S. argyrocarpa*, reaching the same upper limit, but descending a little lower"—and his ample collections within the range reported, viz., from 3,700 to 5,500 feet altitude above the sea, would seem to indicate no scarcity of individual plants. From Mr. Faxon's notes I compile the following list of particular localities: Oakes Gulf, Lake of the Clouds (where it appears to have most frequently attracted the attention of other collectors), Alpine Garden, Tuckerman's Ravine, Hermit Lake, Great Gulf, Spaulding's Spring, Madison Spring and Huntington's Ravine—" where it is quite abundant; but this ravine is so difficult and dangerous that I have never explored it much, not daring to do so alone."

S. phylicifolia is also found on Mt. Mansfield, near the Lake of the Clouds, where it was first noticed by Mr. Pringle.

Mr. Faxon finds the species to vary in habit as follows: 1. In the higher parts of the Alpine Garden, on Mt. Washington, alt. 5,500 ft., it is a depressed and prostrate shrub, seldom rising more than one foot from the ground, fruits rarely, and seems not to endure the rigor of the climate so well as the other Alpine species. 2. " In Oakes Gulf, Tuckerman's Ravine, and around the Lake of the Clouds it is more erect, 2½ to 4 feet high, with stems 1 to 1½ inches in diameter, diffusely branched, sometimes with stems depressed, perhaps by snow, and only the branches ascending or upright." 3. "In the Great Gulf, near Spaulding's Lake, the altitude above the sea is nearly the same as the plant occupies in Tuckerman's Ravine on the opposite side of the mountain, but here it is protected by growing among alders and other small trees, and attains a height of 10 feet, with a stem 4 inches in diameter."

This last is one of Mr. Faxon's interesting discoveries, and gives to *S. phylicifolia* as found in the White Mountains, the same range of variation in stature, dependent upon altitude and exposure, which the species exhibits in Europe.

The characters specified by Prof. Andersson as serving to distinguish his *S. chlorophylla* from the Old World *S. phylicifolia*, are most noticeable in the Rocky Mountain *S. chlorophylla* var. *pycnostachya*, but when we come to compare the plant of the White Mountains and Labrador with the European prototype, we find the leaves are not "more or less covered with silky hairs," the aments are not "narrower and more compact," the capsule is not "shorter pedicelled," the style is not "longer." Absolutely no such differences exist, and Carey, Tuckerman, Barratt and all the early New England botanists were quite right in referring the plant in question to the old Linnæan species. Doubtless Prof. Andersson felt that it would be more convenient every way and would give a more "scientific frontier" to his new species *S. chlorophylla*, to draw the dividing line through the middle of the Atlantic; but, alas, willows will not grow to suit the dividing lines of the wisest of salicologists.

In approaching the study of American willows in their relationship with the European, Prof. Andersson makes the following observations: * "Looking into the American Floras published by various authors since the time of Michaux, we find that the indigenous salices of America (with the exception of a few of the most arctic) all [*sic*] have names totally differing from the European species. Now this was hardly to be expected, when the well-known fact is considered that the vegetation of a large part of the Northern regions is, I dare not say quite identical, but very uniform or homogeneous all round the world. Hence, although the indigenous Willows in America generally are considered different from those in the Old World, we should look for a greater resemblance than has as yet been recognized, not only in the higher Arctic regions (as partially shown in Hooker's Flora Boreali-Americana), but also in the more southern parts. And, in fact, my inquiries have persuaded me that the similarity or analogy in this respect is greater than is generally supposed. With my experience of the European willows, which frequently vary from one extremity of size, form, and color to another, according to the area of the species, * * * I could not be surprised to find many American willows equally varying from ours, although certainly belonging to European types, or at least so analogous to their European relatives that they might be considered as sub-species of them." Good! But turning from this to the pages of the author's latest and most important work—the "Prodromus" monograph—we are surprised to find a wide and unexpected discrepancy between the words of the manifesto and the later performance. In only one single instance * is any American willow before regarded as distinct now for the first time recognized as a sub-species of an European relative; while on the contrary, species are separated or new ones erected upon precisely those characters which the author's experience with Old World forms had already taught him were not to be relied upon.

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* **Synopsis of North American Willows.**

The willow under consideration presents a case in point. In some of its forms it is so very like the European plant, that had Prof. Andersson himself encountered it in one of his Lapland excursions, he would have simply passed it by with the nod of recognition due an old acquaintance. Mr. J. G. Baker (to whose

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* Even this is scarcely to be regarded as an exception! *S. rostrata*, Richards., is made a sub-species of co-equal rank with *S. livida*, Wahl., under the author's *S. vagans*—a new name for a new combination of old species, which not a single botanist on either side of the Atlantic has accepted. Andersson first proposed *S. vagans, cinerascens, occidentalis*, which Dr. Gray shortened into *S. livida* var. *occidentalis*; but whatever rank might be assigned the American plant, surely the old name of Richardson should have been retained, as indeed it was, later, by Prof. Andersson.

knowledge of the range of variation shown by *S. phylicifolia* Sir Joseph D. Hooker defers in his Student's Flora of the British Islands) writes me; "I have carefully examined the White Mountain willow, and felt quite satisfied in my own mind that it cannot be distinguished specifically from our European *phylicifolia.*" This is temperate, but none the less decisive. I would, however, go further and say that often the resemblance is so close as to include even those slight peculiarities of "size, form and color," which we expect to find in two plants of the same species when growing side by side.

Will the reader bear with a bit of personal experience which brought this conviction home to my mind. Last winter I was comparing two sheets of loose specimens, spread out on the table before me; one set from the White Mountains, collected by Mr. Faxon; the other from Lapland, collected by Dr. Hakansson. Both were fresh, admirably prepared, and as it happened both had been taken in exactly the same stage of development. I had carelessly picked up a twig of fruiting aments to examine with the hand-magnifier, but when I came to return the specimen I had forgotten (or to be more exact, I had failed to notice in the first place) from which sheet it had been removed. Superficial resemblances or differences to guide me in replacing the specimen in hand there were none. I soaked up capsules of the two plants, American and European, placed them under the microscope and carefully compared every minute character of scale, pedicel, style, stigmas, etc. Mind, I was not looking for specific distinctions, I only wished to find *some slight individual peculiarity* which would enable me to replace my specimen. I felt piqued to think I should be so baffled, but finally, sooner than vitiate the integrity of the remaining material, I threw my twig of questionable belonging into the fire! I do not wish to be understood as making the sweeping assertion that all the White Mountain and Labrador *phylicifolia* is equally undistinguishable from the European, for I know very well that some forms can be, at once, recognized as peculiarly American. What I do claim is that from a meeting-ground of perfect similarity the American forms diverge not more widely than do the European of the same species.

First Glimpses of South American Vegetation.

By THOMAS MORONG.

A voyage of seventy days may seem in these days of steam an age, but if all ocean trips were distinguished by as pleasant weather as that which the writer enjoyed in the good bark Evie J. Ray, in crossing the Atlantic to the Rio de la Plata, everybody would wish to go to sea, no matter how long the passage. And yet we had seen so much of the " wild waste of waters," that the cry, " Land ho ! " on the afternoon of October 6th was very welcome to our ears, when the Uruguayan coast came intov iew at the mouth of the noble estuary into which the Plate River empties. The land consists of low sand hills and beaches, apparently quite barren, or showing a scanty and stunted vegetation. On swinging across the stream to the Argentine side, one is struck with the fact that the land itself is so low that it cannot be discerned at a mile's distance from the deck of a vessel. Only a few trees, single or in scattered clumps, consisting probably of cultivated Lombardy poplars or the Ombu, the sole indigenous tree of this region, rise above the level, revealing the coast line. The land here is a part of that vast region known as the Pampas, low plains very similar to the flat prairies of Indiana and Illinois, which stretch westward unbroken for many leagues to the foot of the Andes, and southward to Patagonia.

The river, at least as far up as Buenos Aires, although a vast volume of water from 60 to 100 miles in width, is very tame and uninteresting. The water is as yellow with mud as the Potomac or the Mississippi. No plants whatever appear to grow in it. The city of Buenos Aires presents a fine front to the river, but it has no harbor, and the water is so shallow that steamships and sailing vessels are obliged to discharge their cargoes in lighters, unless they can enter the " Boca " (mouth), as it is called, the mouth of the Riachuelo, a small stream some two or three miles south of the city, which has been dredged sufficiently to admit craft drawing 20 feet of water. In fact, most of the sailing vessels are unladen here, and the little port is crowded with shipping of all nationalities.

It is now early spring, and the season corresponds with our April, but the vegetation is much more forward than I have ever seen it in that month in the States north of Maryland. The climate more nearly approaches that of North Carolina, and is even milder, as ice and frosts seldom occur in this latitude, even in midwinter, and snow is unknown. The public gardens, of which there are a number in the city, are already gay with a mass of bloom, mostly of exotic plants. Several species of *Acacia*, brought from the northern part of the Republic, or from Paraguay, exhibit great clusters of yellow flowers. Tree mallows, as tall as one's head, and many other shrubs and herbaceous plants that I do not recognize are here, while the coco palm waves its broad fronds in the air and lends a tropical aspect to the scene. Upon the banks of the river, and on the low grounds and vacant lots in the outskirts of the city, still sodden with the recent rains, I collected a number of interesting plants, most of them quite new to me. In the pools or upon their borders abounded the *Sagittaria Montevidensis*, somewhat stouter than our *S. variabilis*, *Acicarpha tribuloides* (Ord. Calyceræ), with heads of small white flowers set on a thorny involucre, *Spergula grandiflora*, *Cerastium Commersoniana* (*C. humifusum*, Camb.), *Lepidium pubescens*, *Senecio Hualtata*, a stout composite common here in damp soils, and now in full flower, and *Ranunculus* (*Aphanostema*) *apiifolius*, a tall species of the *abortivus* group, with shining leaves. In company with these occurred several introduced species, which had a familiar home look to my eyes, such as *Ranunculus muricatus*, *Medicago denticulata*, *Lilæa* (*L. subulata?*), *Capsella Bursa-pastoris* and *Sonchus oleraceus*. *Conium maculatum*, growing rank and high, has taken possession of many of the sloughs and miry beds, and *Rumex pulcher* is common along the gutters and by the house walls. *Brassica* (*Sinapis*) *alba* is the "charlock" which invades the grain fields and cultivated grounds, as do the allied species at home. In one spot on the garden borders I picked up *Anagallis cœrulea*, growing vigorously, a foot or more in height, and already in fruit, though its bright blue, yellow-eyed flowers were still abundant. A handsome *Fumaria* unknown to me, but which, as I am informed, is an introduced species, sprang up under the fences, and clambering over a thicket of small thorny

Acacias, not yet leaved-out, was a bright red, delicate *Tropæolum,—T. chymocarpum* (*T. pentaphyllum*, L.), and on the edges of the same thicket, in a ditch was *Tradescantia Guyanensis*, bearing delicate white flowers. The only native shrub which I found in bloom was *Cestrum Parqui*, some two or three feet in height, with light yellow tubular flowers, a member of the Order Solanaceæ.

Oddly enough, this shrub has a fancy for growing upon the roofs and projecting walls of old houses in the city. Nearly all the buildings here are square structures, one or two stories in height, made of brick or stucco, with flat roofs, of the type so common in Spanish and Italian cities. To the tiles or along the coping and roof gutters of many of these, you may see a whole wild garden clinging. Besides the *Cestrum*, which thrusts itself out horizontally over the sidewalk, I noticed various grasses, *Sonchus*, *Geraniums*, *Oxalis*, Dandelion, Shepherd's-purse, *Cerastium*, and various other herbaceous plants.

In wet grounds I came across a strange thing named *Hymeranthus Yaborosa* (*H. integrifolia*, L.), which has a long white corolla tube, with five spreading segments, the included stamens and stigma just filling the throat, around which were sprinkled honey glands for the delectation of visiting insects. This plant bears a long white root which runs just under the surface of the ground, and throws up at intervals single leaves and scapes in the manner of our *Aralia nudicaulis*. It belongs to the Order Solanaceæ. Some of the lowland pastures are densely covered with a bright blue, yellow-eyed *Sisyrinchium*, called by Grisebach (Symb. ad. Fl. Arg.), *S. Bonariense?* The *Sisyrinchiums* of this part of South America are very numerous, and as yet poorly defined. The same may be said of the *Solanums*, of which I saw several species, among them *S. nigrum*, var., *S. spinossissimum*, *S. bœrhaavæfolium*, *S. sisymbriifolium* (so I thought it), and a species brought from the Grand Chaco territory, probably undescribed. The plant that I shall be likely to remember the longest is a nettle, very common here in waste grounds, which on first sight I took to be *Urtica dioica* or *U. gracilis*, and which I boldly grasped as I had so often done at home. It proved, however, to be a much more formidable species, armed with numerous spines, the sting of which made my fingers tingle for hours afterwards. It is *Urtica spathulata,* which I warn all North American botanists who follow in my track to collect with gloves on their hands.

Soon after my arrival I took the cars to La Plata, a city which lies about 20 miles to the south of Buenos Aires, in order to pay a visit to the well-known botanist, Dr. Carlos Spegazzini, who was formerly connected with the University of this place, but is now a Professor in the Colegio Nacional of La Plata. Dr. Spegazzini received me with the utmost cordiality, and even left his classes in the college to escort me to his home, and accompany me back to this city. To his extensive knowledge of the local flora I am indebted for the means of identifying many of the plants mentioned in this article. In his garden, growing spontaneously, were quite a number of the wild plants common in the vicinity, such as *Erigeron Bonariense*, *Gnaphalium Americanum*, *Soliva anthemiifolia*, *Soliva sessilis*, *Malva parviflora*, *Heliosciadium leptophyllum*, and *Bromus unioloides.* I also had the pleasure of getting from his grounds Herbarium specimens of a number of the rare shrubs which grow in the northern provinces of Argentina, such as *Duvaua longifolia*, *Tillandsia bicolor*, *Carica* (*Vasconella*) *quercifolia* and *Buddleia hebiflora.* Dr. Spegazzini has devoted much attention to the Fungi, Characeæ and other cryptogamous plants, and also to the Gramineæ, of which he has a large collection. He has published a number of works upon South American plants, having travelled as far South as Terra del Fuego to make observations. He is an enthusiastic botanist, and received me with a courtesy and generosity for which I cannot be too grateful.

I have also made several excursions from the city in other directions, mainly for the purpose of observing the Pampas, upon which I have for years longed to gaze. For many miles in this vicinity these plains are cultivated in villages or cattle farms, known as Estancias, and therefore cannot be seen in all their native wildness. For that one must travel from one hundred to two hundred miles, but what I can see within easy reach shows clearly the prodigious vitality and fecundity of the thistles, which, as is well known, have invaded the soil by legions, and are so tenacious of life that it is almost impossible to subdue them. There are several varieties of these thistles. The most common is the cardoon, not yet in blossom, but in some instances beginning to form heads. This has a broad, prickly leaf, blotched and striped with white, and does not in this region grow to any great height. The gigantic Pampa thistle, *Silybum Marianum*, less numerous, but a much taller plant when full grown, is just coming into flower, which has a very pretty, bright red color. The cardoon, in some places as far as the eye can see, occupies every foot of the ground. In cleared spaces here and there I saw herds of cattle grazing, or ostriches stalking about like domestic fowls. Occasionally I saw flocks of sheep and herds of cattle which could be numbered by thousands, but neither their teeth nor their feet seemed to lessen the number of the thistles which hold possession of the ground, and increase in spite of man and beast.

Among the cultivated trees around dwelling houses and by the roadsides, was the peach, which is planted in orchards and bears well, the Lombardy poplar, the Australian *Eucalyptus*, *Robinia pseudacacia*, *Acacia Bonariensis*, popularly called the Ñapinday, *Melia Azedarach*, here known as the Tree of Paradise, *Tamarix Africana*, and *Nicotiana glauca*, called by the natives Palampalan (pronounced with a strong accent on the final syllable). The Eucalyptus is popularly regarded as a security against malaria, and for this reason is extensively cultivated in this region, but all the Eucalyptus trees in the world, combined with the "Good airs" for which this town and province are named, will not save from epidemics a city in the suburbs of which the sewerage is allowed to meander at its own wild will and to stand in green, slimy pools above ground, and the carcases of animals left to rot where they die by the street side or in the vacant lots. My eyes and nose can testify to the fact that the germs of malaria, the cholera, the yellow and typhoid fevers, the diphtheria, and kindred scourges must find a congenial soil in the Boca and other neglected portions of this city.

The Eucalyptus, whether it possesses anti-malarial virtues or no, grows into a handsome and good-sized tree in this country, and when planted in masses forms a very agreeable shade for dwelling houses. The Lombardy poplar and the locust do no better than in New England, and are scarcely worth the ground which they occupy. I would like to see the experiment tried of importing our maple into this region. The silver poplar is occasionally seen, and seems to thrive, and I know no reason why the maple might not.

The nests of several orchard birds give a peculiar aspect to the house surroundings here. Among these is the "Hornero," the "Baker" or "Oven-bird," somewhat smaller than our robin, and so called because it builds a curious, round, oven-like habitation of mud which, after the fashion of our barn swallow, it plasters over the tops of posts, stumps, the ends of broken limbs, and even on the sides of houses. I knocked off one of these ovens and found it to be roofed over, with the entrance at the side, the walls an inch in thickness, and the whole weighing not less than eight or ten pounds. It indicates a great deal of industry and perseverance on the part of this little creature to be able to carry so much mud in its bill, and no little ingenuity to construct a nest which is as round and even as though it were smoothed by the trowel of a mason. On some of the peach trees, scarcely higher than a man's head there were other nests which at first view looked like baskets of twigs. One of these, the work of a bird smaller than the Hornero and known as "El Leñateros," or "Twig-gatherer," is as large as a peck basket, made of small twigs, the ends of which are very ingeniously twisted and hooked together. I thought when I first caught a glimpse of this nest, that it must be the home of an eagle at least, and wondered how it came to be placed in the crotch of a small tree, where it looked as much out of place as a marten house would if placed upon a huckleberry bush. When closely examined it proved to be a regular twig hut, the real nest being a small cavity in the interior, the entrance to which is on the side. Frail as the structure looks, yet it can withstand the pamperos, the violent winds which frequently blow from the southeast across the pampas, and cling fast even while the slender tree is bent almost to the ground.

Around the gardens were old hedges of the Indian fig cactus and the Mexican *Agave*, which grows luxuriantly in this climate.

Specimens of the *Agave* that I saw had leaves six feet in length. I am told by residents here that this plant throws up its tall spike of flowers annually. I do not feel sure that such is the case, but at all events it must flower quite often, and little deserves the name of the "Century Plant." I am surprised that the fibrous threads into which the leaves of this plant can be split has never been utilized for making cloth or cordage. While the leaf is fresh the filaments can be pulled apart by the fingers with the utmost ease, and they are as fine as sewing cotton and wonderfully strong. With their great length they should be equal, if not superior, to hemp for working purposes, and I see not why they would not be fully as strong and flexible as the hemp fibres.

In closing this article, which is written under great difficulties, I wish to acknowledge the many courtesies extended to me by the gentlemen connected with the Public Museum, the Public Schools and the English press of this city, as well as by American residents and business men to whom I brought letters of introduction. I have already spoken of Dr. Spegazzini. I am also especially indebted to Dr. George J. Ryan, Director of the Normal School, who has greatly interested himself in my work, and to Hon. B. W. Hanna, our United States Minister, who has done all in his power to facilitate the object for which I have visited this country, and whose assistance has been of great value in my intercourse with Argentine officials.

BUENOS AIRES, Oct. 26, 1888.

On Gyno-Diœcious Labiatæ.

Diœcious Labiatæ are not uncommon among the genera and species of the Old World. The plants are not absolutely of separate sexes, but in the one case individual plants have hermaphrodite flowers abundantly fertile, and plants wholly female through the total abortion of the anthers. So far as I know, no American species has presented this character, but European species of this class, introduced to this country, retain the peculiarity, showing that the tendency is inherited, and is not due to the accident of environment. Dr. Gray notes that this character—termed gyno-diœcious—exists here among the introduced

Menthas, and Mr. Howard Shriver observed it in *Nepeta hederacea*, which I can confirm, and I have seen also that it follows the European Garden Thyme here to the same extent as in the Old World.

I want now to add another species to the list observed in the Old World, though it is an Old World species from the mountains of Caucasus— *Nepeta grandiflora.* I have two plants from seed sent from Europe, showing the tendency is inherited. One is hermaphrodite, the other (by abortion) purely pistillate.

The case is specially interesting in view of the endeavor of Mr. Darwin to detect differences accompanying the separate conditions of the gyno-diœcious plants. (See Forms of Flowers, Chapter VII). He seems to have noted little besides a greater number of flower heads on the hermaphrodite, though there were a greater weight of seeds from the female, in the case of the thyme. The results are exactly the same in *Nepeta grandiflora.* There are many more heads of flowers than in the female, but in the hermaphrodite plant many flowers fail to perfect and fall, while on the female apparently every flower results in perfect seed. It is probable, therefore, that it is not because the seeds are heavier in one than in the other, but because there are more perfect seeds though fewer heads.

There is in these *Nepetas* a great difference in the plants. The internodes in the hermaphrodite are one and one-half inches; in the female there is but an inch between the nodes. This tendency pervades the inflorescence, hence while the hermaphrodite is loosely verticillately-spicate, in the female it is glomerate-spicate.

The flowers differ remarkably. They are almost inconspicuous in the female, while worthy of the specific name *grandiflora* in the hermaphrodite. They are about three times the size of the female ones.

The failure of some of the flowers to mature seed is not probably due to matters connected with pollinization. The pistils in the hermaphrodites are evidently as perfect as those in the female, and, as they are receptive only after their own pollen is shed, they have the same chance to have pollen from neighboring flowers (though from the same plant) as the female has. It is probably due to lessened chances to obtain nutrition, which I have shown in other papers is not favorable to the female or reproductive power. A greater amount of nutrition is spent on the large corolla, which is saved in the smaller female one.

The Labiatæ are well-known for the tendency to abort stamens in many genera and species. The law under which this is accomplished is still obscure. Whatever that may be as affecting all the individuals of one genus or species, it can scarcely be identical with that which causes gyno-diœcism among individuals of the same species, yet the very fact that similar results appear to come from different agencies, gives the whole question an interest that should attract to it renewed attention. I do not know any subject that promises better reward, and one of the aims of this paper is to stimulate observations by botanical students.

THOMAS MEEHAN.

Notes on the Flora of the Palisades of the Hudson.

Frequent visits to the Palisades, extending through an entire season, enable me to report the following plants as growing within a distance of three miles northward from Englewood, which I have never met with on the opposite side of the river in New York City, where I have long been closely familiar with the flora:

Cerastium arvense, L. Common along the top of the Palisades. It flowers in May, in some places adorning the brink of the cliffs with a fringe of white bloom. It occurs on Manhattan Island near High Bridge.

Impatiens aurea, Muhl. Flowering opposite Riverdale on August 18, 1878, and near Englewood, September 17, 1887. Has been reported from further down the river.

Amorpha fruticosa, L. A group of plants on the shore opposite Mt. St. Vincent; flowering June 21, 1888. Has been reported from near Tarrytown.

Desmodium cuspidatum (Muhl.), Hook. Woods at the top of the Palisades opposite Riverdale (in fruit September 18, 1887), and two sterile plants near the shore a mile above.

Phaseolus polystachus (L.), B. S. P. Found at two places on rocky wooded slopes across from Spuyten Duyvil. It grows luxuriantly, but seems to be mostly sterile, although some full sized pods were found September 22, 1888. Has been reported from New York Island and from Tarrytown.

Baptisia tinctoria, R. Br. Near Englewood. Singularly enough this common plant seems to be wanting on the opposite side of the river.

Crantzia lineata (Michx.) Nutt. On the shore across from Mt. St. Vincent.

Sambucus racemosa, L. Wooded slopes along the Palisades.

Solidago arguta, Ait. Sparingly in woods at the top of the Palisades opposite Mt. St. Vincent. Flowers past their prime September 23, 1888.

Cynoglossum Virginicum, L. At several places. With small flower buds, May 30, 1887.

Orontium aquaticum, L. Woods back of the Palisades, nearly opposite Mt. St. Vincent. Past flowering May 30, 1887.

Woodsia Ilvensis (L.), R. Br. On the edge of the cliff at Indian Head.

In connection with this list of plants are to be noted the following, which occur on the New York side of the Hudson only at one or two stations:

Arabis lyrata, L. Abundant on the exposed stony slopes at the foot of the Palisades, and extending up the face of the cliffs wherever it can find a root-hold. On the opposite shore a few plants grow near Spuyten Duyvil and Riverdale.

Geranium Robertianum, L. Common on the rocky, wooded slopes of the Palisades. It occurs on Manhattan Island near High Bridge.

Staphylea trifolia, L. Found only at a single station on the New York side of the river, two miles inland.

Rubus odoratus, L. Common; on the contrasted side of the river it occurs only near the shore at Riverdale.

Cornus circinata, L'Her. On the New York side only at one inland station.

Galium lanceolatum, Torr. Not uncommon; on the New York side at only one spot, near the river.

Solidago squarrosa, Muhl. Common; on the New York side it occurs sparingly near the river between Spuyten Duyvil and Mt. St. Vincent.

Gaultheria procumbens, L. Common; on the New York side I have found it only near Fordham.

Gerardia Virginica (L.), B. S. P. Not uncommon; it occurs opposite only at one station on Manhattan Island on the bank of the Harlem River.

Teucrium Canadense, L. Quite common; on the opposite shore I have met with it only on Ft. Washington Point.

Asclepias verticillata, L. Common; on the New York side I knew of a single station for it where it is now extinct.

Andropogon provincialis, Muhl. This is the only grass I have met with on the Palisades which is not well represented on the opposite side of the river, where it occurs at only one locality. It is frequent along the top of the cliffs.

EUGENE P. BICKNELL.

Riverdale, N. Y. City.

Gentiana alba, Muhl.

A gentian, discovered many years ago, by Dr. Gray, during a botanical trip through the mountains of West Virginia, was described and published by him in the Am. Journal of Science as *G. flavida*, but in the first edition of the Manual it reappeared as "*G. alba*, Muhl., Cat!" with the statement, that, although the name is inappropriate and the giver of it has left on record no character of the plant, he regards the two as identical. Among the synonyms cited is the *G. ochroleuca*, Frœl, of the Flora Cestrica (ed. 2), and Dr. Darlington, following such high authority, supplants it by *G. alba*, Muhl., in the subsequent editions of his work. Now, strange to say, the specimens in his herbarium at West Chester, Penn., prove that he was right in the beginning. They are all *G. villosa*, L. (*G. ochroleuca*, Frœl.). The same is true of the citation from Torrey's Flora of New York (ii. 106). Dr. Torrey expressly says that he had seen no specimens of the plants he describes, but his description, with its "obovate leaves and wingless seeds," clearly indicates *G. ochroleuca*, Frœl. Hence, *G. alba*, Muhl., should be dropped from the Catalogue of the Torrey Club.

In Muhlenberg's Catalogue (ed. 2), under *Gentiana*, occur these three species: "2, *Saponaria*, L."—which is probably correct; "3, *ochroleuca,* Frœl., (*Saponaria,* Mx.),"—which may be *G. ochroleuca*, Frœl., and "4, *alba*," which points most likely to *G. Andrewsii*, Griseb., whose corolla-plaits, and sometimes the corollas entire, are pure white, whilst those of *G. flavida* are tinged more or less with yellow.

In the Synoptical Flora, Dr. Gray gives this range for the species in question.—"W. Canada and L. Superior, south to Illinois and Kentucky and the mountains of Virginia, east to Pennsylvania and New York."

In Pennsylvania it is a very rare plant and not known further eastward than the central Alleghany region. I have it from two stations, collected at one in Lycoming County, by McMinn, and the other in Huntingdon County, where it was collected near Birmingham, on Little Juniata river, by J. R. Lowrie, September, 1875, and by myself also at a later date.

There being no certain evidence, therefore, that Muhlenberg ever saw it, the species should hereafter bear the name of *Gentiana flavida,* Gray.

THOS. C. PORTER.

Onondaga Indian Names of Plants.

CORRECTIONS.

O-skwen-e-tah is Snake Root. A revision of my list by my Onondaga friends gives the following alterations: *Ta-keah-noon-wi-tahs*, Violet; *Oo-hoosk-ah*, Slippery Elm; *Teu-tone-hoh-toon*, Black Raspberry; *Juke-ta-his*, Sarsaparilla; *Cho-koh-ton*, Balsam Fir; *Oo-a-hoot-tah*, Sweet Flag; *Oo-nah-na-tah*, Artichoke; *O-yun-wa*, Golden Rod. The changes are slight, but important. I gave the Oneida name for the Hop; the Onondaga is *Ah-weh-ha*, or "Flower," as in the other.

ADDITIONAL PLANT NAMES.

Oot-kwen-tah-ke-ehn-yo, "New growth is red." This is another name for a small variety of the Red Maple. *Oo-kah-ta*, "Not ripe;" Blue Cohosh, but applied to the others. *Oo-sa-tah*, Grey Willow; *Oo-na-too-kwa*, "Rushes that grow high," or "Plenty of flags growing," Cat-tail. *Kah-a-wa-soont-hah*, "Flower coming from Sunflower," Elecampane and Artichoke.

Ka-sa-yein-tuk-wah, "It brings the frost," Wild Aster. *Teu-te-nah-ki-en-tun-oo-noo-kwa-sa,* "Sheep Burr," Hound's Tongue. The first six syllables mean sheep. *Oo-koh-ha-tah,* Elm ; *Kah-en-ta-keh-a-tah,* White Oak ; *O-yen-kwa-hon-we,* "Real Tobacco," (*N. rustica,* Lin.) *Deut-soo-kwa-no-ne,* "Round Nut," Black Walnut. *Ka-ha-tak-ne,* "Dusty Fruit," Wild Plum.

W. M. BEAUCHAMP.

Botanical Notes.

The Audubon Monument. A committee appointed by the New York Academy of Sciences has been at work for some months obtaining funds for the erection of a monument to John James Audubon in New York City. As an incentive towards contributions, this committee has obtained prints from the best portrait of Audubon in existence, and is prepared to furnish them to all who will contribute one dollar or more. These portraits are of two sizes, the one suitable for binding in a journal ; the other suitable for framing. Remittances should be made to the Treasurer of the Audubon Monument Committee, New York Academy of Sciences, Columbia College, New York City.

A National Museum has been established in Costa Rica, and its first annual report has been received. From this we learn that an earnest commencement has been made toward the formation of an herbarium. Mr. J. J. Cooper has been employed to collect plants, which are to be sent to Capt J. D. Smith, of Baltimore, for determination. A collection of two hundred wood-sections, each one meter in length, has already been made.

Index to Recent American Botanical Literature.

Botanical Notes.—Mary K. Curran. (Proc. Cal. Acad. Sci., 2d Ser., i. Also reprinted).

The great interest which centers at present in the Pacific coast flora leads us to welcome eagerly any contribution upon the subject. The writer of this paper has evidently collected and observed much, and might have given us—what upon casual reading this seems to be—a valuable and reliable contribution. But careful comparison reveals violations of the scientific spirit so flagrant, and misrepresentations so serious, that we are obliged to distrust all that we have not the means for verifying. Almost at the outset we are informed that the true position of *Staphylea* is in the Zygophyllaceæ, between *Guiacum* and *Chitonia!* And this merely because any other position would compel her to accept the genus of a person whom she does not like. At the same time Mr. Greene is accused of relegating the plant in question (*Viscainoa geniculata*, Greene) to the Euphorbiaceæ, an accusation entirely without foundation, he having expressed precisely the opposite opinion. *Dendromecon flexile*, Greene, is declared to be merely a luxuriant form of *D. rigidum*, Benth. After examining ample specimens of both species, we are inclined to regard them as being about as closely related as *Cornus Canadensis* and *C. florida*. The several species of *Eschscholtzia*, which have been separated with so much care by Bentham, Watson and Greene, are here indiscriminately referred back to *E. Californica*. Although the genus is rather a difficult one, we are impressed by seeing specimens inscribed in the handwriting of Dr. Gray with most of the names of the above authors. It is also noteworthy that while we found *E. Californica* growing abundantly in Chili, we could never find, during our short stay in that country, any variation from the type. We also find the opinion expressed that all the forms of *Rhamnus Californica* run into *R. Purshiana*, a mistake which, practiced in the collection of barks, renders many medicinal extracts of the latter nearly worthless. H. H. R.

Calandrina oppositifolia. S. Watson. (Gard. Chron., iv., 601, fig. 83.)

California Medicinal Plants.—Notes on.—Jas. G. Steele. (Pharm. Rec., ix., 7–8.)

Calochortus Gunnisoni.—Undescribed Varieties of.—T. D. A. Cockerell. (West Am. Sci., v., 17.)

Three new varieties are described—var. *imaculatus*, var. *immaculatus* and var. *purus*.

Catalpa speciosa for Timber Planting. G. W. Fincher. (Garden and Forest, ii., 21.)

Cypéracées de l'Ecuador et de la Nouvelle-Grenade de la Collection *de M. E. André.* P. Maury. (Journal de Botanique, ii., 389–396; 418–425.)

The great value of the enormous collections accumulated by M. André in Northwestern South America is being made known through the studies of numerous botanists. M. Maury contributes an enumeration of the Cyperaceæ, 58 species. He notes that it includes about two-fifths of the species of the order known to grow in Ecuador, Colombia and Venezuela. The new species are as follows: *Cyperus flexibilis, C. Andreanus, Dichromena fasciata* and *Rhynchospora panicifolia.* N. L. B.

Diatomaceous material—Cleaning recent.—F. W. Weir. (The Microscope, ix., 1–4.)

Although the writer modestly claims no originality for any part of the process he describes, yet he has prepared a paper which cannot fail to be very serviceable to those who are desirous of learning how to clean recent gatherings. C. H. K.

Eugenia Garberi. C. S. Sargent. (Garden & Forest, ii., 283 0, fig. 87.)

This is a new species collected by Garber and Curtiss and Professor Sargent. It has beautifully glossy, acuminate leaves.

Ferns. W. H. Gower. (Garden, xxxiv., 461.) *Pellæa ternifolia, P. sagittata, P. flexuosa, P. atropurpurea, P. geraniifolia* and *P. intermarginalis* are described and the latter figured.

Forestry Convention. Address by Prof. F. L. Harvey.—A reprint of the author's paper read at Bangor, Me., Dec. 18th, 1888.

Forests and Woodlands of New Jersey.—I. (Garden and Forest, ii., 33.) From advance sheets of the final Reports of the Geological Survey of New Jersey.

Fungi.—New Species of from various localities. J. B. Ellis and B. M. Everhart. (Journ. Mycol., iv., 121–124.)

Eighteen species are described. In this connection it will be of interest for us to state that the editors of the Journal of Mycology give notice that it will be published during the year 1889 as a quarterly, edited under the direction of the Commissioner of Agriculture, and will be distributed free to all the present subscribers; this arrangement will doubtless have the effect of giving this useful magazine a much wider circulation.

Ilex.—A partial Chemical Examination of some Species of the Genus. F. P. Venable. (Journ. Elisha Mitchell Sci. Soc., v., 128–130.)

Lackawanna and Wyoming Valleys.—A Preliminary List of the Vascular Plants of the.—W. R. Dudley. (Proc. and Coll. of the Lack. Inst. of Hist. and Sci., i., 29–106.)

This list, which bears evidences of considerable care and trouble in the collecting and identifying of specimens upon which it is founded, is unfortunately marred by innumerable typographical errors—certainly no fault of the author. Seven hundred and sixty-nine species and varieties are enumerated. Among the most interesting notes is the record of the discovery by Prof. Dudley of *Arceuthobium pusillum* at Little Roaring Brook and Lehigh Pond.

Lepicystis sepulta. W. H. Gower. (Garden, xxxiv., 566, illustrated.)

Lonicera sempervirens. F. W. Burbidge. (Garden, xxxiv., 300–301, Pl. 668.)

Mountain Forests.—The Influence of.—(Garden and Forest, ii., 1.)

Neillia Torreyi. S. Watson. (Garden and Forest, ii., 4., fig. 84.)

Physianthus albens. (Garden, xxxiv., 397, illustrated.)

Physiological Botany.—Principles of, as applied to Horticulture and Forestry.—I., II., III. Geo. L. Goodale. (Garden and Forest, ii., 8–9, 20–21, 32–33.)

Polypodium Picoti. (Garden, xxxiv., 577, illustrated.)

Practical Botany. W. W. Bailey. (Common School Education, Jan., 1889.) The first of a series of articles under this heading.

Pseudophœnix Sargenti. (Gard. Chron., iv., 408, fig. 56.)

Rare Trees of Rhode Island. L. W. Russell. (Garden and Forest, ii., 34.) The following are mentioned: *Quercus* *palustris*, *Q. obtusiloba*, *Liriodendron Tulipifera*, *Juglans nigra* and *Diospyros Virginiana.*

Relation Between the Growth and Form of Leaves. L. P. Gratacap. (Proc. Nat. Sci. Asso. of S. I., Dec. 8th, 1888.)

Schubertia grandiflora. (Garden, xxxiv., 341, illustrated.)

Shortia galacifolia. W. W. Bailey. (Garden and Forest, ii., 34.)

Smilax tamnoides. (Garden, xxxiv., 304, illustrated.)

Stuartia Virginica. (Garden, xxxiv., 280, illustrated.)

Symphoricarpus vulgaris. (Garden, xxxiv., 280, illustrated.)

Weeds of the Nebraska Plains—A few notable. C. E. Bessey. (Amer. Nat., xxii., 1114-1117.)

Notes on *Cenchrus tribuloides; Solanum rostratum*—known as "Buffalo-bur;" *Helianthus annuus*, *Hordeum jubatum*, "Tickle-grass," and the two tumble weeds of the region, *Amarantus albus* and *Cycloloma platyphyllum.*

White Huckleberries. B. A. Westbrook. (Garden and Forest, ii., 10.)

A description of what is apparently a permanent variety of *Gaylussacia resinosa*, with white fruit, growing in New Jersey along the Delaware River from Carpenter's Point to Wallpack Bend. This must be Dr. Porter's var. *leucocarpa*, characterized in the January BULLETIN.

Yucca angustifolia—A chemical study of. Helen C. DeS. Abbott. (Trans. Amer. Phil. Soc., xvi., 254-284.)

Proceedings of the Club.

The annual meeting was held Tuesday evening, January 8, 1889, the President in the chair and twenty-five persons present.

Mr. Sterns, Chairman of the Botanic Garden Committee, read the appeal prepared by the Committee, which was adopted.

The following officers for the ensuing year were elected. President, Dr. J. S. Newberry; Vice-President, Mr. Thos. Hogg; Treasurer, Dr. J. I. Northrop; Recording Secretary, Miss M. O.

Steele; Corresponding Secretary, Miss Helena C. Gaskin; Curator, Miss Louise M. Stabler; Librarian; Mr. M. L. Delafield, Jr.; Editor, Dr. N. L. Britton; Associate Editors, Miss Emily L. Gregory, Ph.D., Prof. Jos. Schrenk, Dr. H. H. Rusby, Prof. C. Henry Kain, Mr. Arthur Hollick.

Prof. T. C. Porter presented notes upon several species of our native flora. Among them an *Aster*, related to *A. cordifolius*, but apparently undescribed.

Dr. Britton showed a specimen of a new species of *Rhexia* from May's Landing, N. J., collected by Dr. J. E. Peters. From the aristate petals Dr. Britton proposes for it the name of *R. aristosa.* Dr. Willis presented specimens of flowering shoots of *Acer dasycarpum* from a tree which has the peculiarity of blooming each year in the late autumn or early winter. Dr. Newberry showed specimens of the fruit of *Apieba Tibourba* from Central America, and remarked on the oil extracted from the seeds, a bottle of which was also shown.

At the adjourned meeting of Jan. 23, the President was in the chair and twenty-one persons present.

Mrs. Matilde Sutro, Mr. E. S. Miller and Mrs. Alla Doughty were elected active members.

Prof. L. H. Bailey was elected a corresponding member.

Dr. Emily L. Gregory read a paper on "Some Special Forms of Periderm," which was illustrated by a series of microscopical preparations, taking up especially the corky, wing-like growth of *Liquidambar*, *Quercus macrocarpa*, *Euonymus alatus* and *Acer campestre.*

Mr. Sterns reported that copies of the appeal for a Botanical Garden had been distributed. He gave some account of the universally favorable comments of the press. On motion it was resolved that the Botanic Garden Committee of last year be reappointed by the President and instructed to make every reasonable effort to advance the project of a public botanic garden in New York City.

BULLETIN

OF THE

TORREY BOTANICAL CLUB.

Vol. XVI.] New York, March 8, 1889. [No. 3.

An Enumeration of the Plants Collected by Dr. H. H. Rusby in South America, 1885-1886.—V.

(Continued from p. 20.)

CARYOPHYLLEÆ.

Silene Gallica, L. Sp. Pl. 595. Near La Paz, 10,000 ft. (2476).

LYCHNIS ANDICOLA (Gill.) (*Silene andicola*, Gill. Bot. Misc. iii. 147). Sorata, Bolivia, 10,000 ft. (1179).

Cerastium arvense, L. l. c. 628. Sorata, 10,000 ft. (1193 and 1194). Forms not quite identical with any boreal ones.

Var. *arvensiforme* (Wedd.) Rohrb. Linnæa, xxxvii. 305. Unduavi, 8,000 ft. (1191).

Cerastium Soratense, Rohrb. l. c. 291 (?) Unduavi, 8,000 ft. (1192). Specimens with very large sepals, perhaps an undescribed species.

Stellaria media (L.) Smith, Engl. Bot. t. 537. Sorata, 8,000 ft. (1190).

Stellaria nemorum, L. l. c. 603. Yungas, 6,000 ft. (1186); Ingenio del Oro, 10,000 ft. (1184); also a form with sessile, thin, not acuminate leaves, perhaps a distinct species, from Yungas. (1185).

Arenaria lanuginosa (Michx.) Rohrb. in Mart. Flor. Bras. Caryphyll. 274. (*A. alsinoides*, Willd.) Sorata, 10,000 ft. (1188); Unduavi, 8,000 ft. (1187); also a form with short leaves and very pubescent stems from Unduavi, 10,000 ft. (1189), and another one from the same place, smoother and forming dense tufts. (1195).

Drymaria cordata (L.) Willd. in Rœm & Schult. Syst. Veg. v. 406. Yungas, 6,000 ft. (1182).

Drymaria pauciflora, Bartl. in Presl, Rel. Hænk. ii. 8. Near La Paz, 10,000 ft. (1183).

TISSA VILLOSA (Pers.) *Spergula villosa*, Pers. Syn. i. 522; *Spergularia villosa* (Pers.) Cambess. in St. Hillaire, Flor. Bras. Merid. ii. 129). Near La Paz. 10,000 ft. (1180); Yungas, 6,000 ft. (1181).

PORTULACEÆ.

Portulaca pilosa, L. Sp. Pl. 639. Near La Paz, 10,000 ft. (1445).

Talinum patens (L.) Willd. Sp. Pl. ii. 864. Yungas, 4,000 ft. (1931).

Calandrinia caulescens, H. B. K. Nov. Gen. vi. 78. Yungas, 6,000 ft. (2601).

HYPERICINEÆ.

Hypericum brevistylum, Chois. Prodr. Hyper. 51. Sorata, 13,000 ft. (1389).

Hypericum thesiifolium, H. B. K. l. c. 192. Unduavi, 8,000 ft. (1196).

Hypericum struthiolæfolium, Juss. Ann. Mus. iii. 160. Sorata, 13,000 ft. (1350). A depressed alpine form.

Vismia Guianensis (Aubl.) Pers. Ench. ii. 86. Mapiri, 2,500 ft. (1810 and 722).

Vismia Cayennensis (L.) Pers l. c. Guanai, 2,000 ft. (860).

Vismia glabra, Ruiz & Pav. Syst. Flor. Per. i. 183. Yungas, 6,000 ft. (720).

Vismia tomentosa, Ruiz & Pav. l. c. Unduavi, 8,000 ft. (719). Apparently this species, but no authentic specimens seen.

GUTTIFERÆ.

Clusia insignis, Mart. Nov. Gen. & Sp. iii. 164. Mapiri, 5,000 ft. (1242). The same as Lechler's No. 2,204 from Peru, and from insufficient material is doubtfully referred to this species.

Clusia Criuva, Cambess. in St. Hil. Flor. Bras. Merid. i. 245. Mapiri, 5,000 ft. (1246). Apparently this species, but flowers sessile.

Clusia latipes, Planch. & Triana, Ann. Sci. Nat. (IV.) xiii. 365. Mapiri, 5,000 ft. (1809).

Havetia laurifolia, H. B. K. Nov. Gen. & Sp. i. 204 (?) Unduavi, 8,000 ft. (1771).

Tovomita umbellata, Benth. in Mart. Flor. Bras. Guttif. 448. Mapiri, 5,000 ft. (1849).

Tovomita (?) Same locality, (2621).

Chrysochlamys myrcioides, Planch. & Tri. Ann. Sci. Nat. (IV.) xiv. 106. Yungas, 6,000 ft. (2665).

Rengifa acuminata, Planch. & Triana, l. c. xiv. 243. Beni River. (2481). Doubtfully referred to this species.

Symphonia globulifera, L. f. Suppl. 302. Mapiri, 5,000 ft. (1853).

Rheedia Spruceana, Engl. in Mart. Flor. Bras. Guttif. 463. Beni River. (2093).

Quiina ; a species collected in fruit, perhaps undescribed. Junction of the Beni and Madre de Dios (2675).

No. 2613 collected at the Falls of Madeira, Brazil, is apparently of this order, but the specimens are too imperfect for determination.

TERNSTRŒMIACEÆ.

Caryocar glabrum, Pers. Ench. ii. 84. Junction of the Beni and Madre de Dios. A form or variety with leaves more serrate than usual (861.)

Marcgravia rectiflora, Triana & Planch., Ann. Sci. Nat. (IV.) xvii. 364. Yungas, 6,000 ft. (2092 and 2612 ;) also a scrap from Reis, 1,500 ft. (2707.)

Marcgravia. Yungas, 6,000 ft. (1362.) I brought this from Kew with the name *M. peduncularis*, Pœpp., but am now unable to find this name either among the species recognized by Wittmack in the Brazil Flora nor in his synonymy. It is therefore left for subsequent investigation.

Ternstrœmia Brasiliensis, Cambess. in St. Hil. Flor. Bras. Merid. i. 298. Mapiri, 5,000 ft. (486.)

Ternstrœmia confertiflora, Triana & Planch. in Herb. Kew. Mapiri, 5,000 ft. (617.)

FREZIERA INÆQUILATERA, spec. nova. Caulis rectus, villoso-pubescens ; foliis rigidis, elliptico-lanceolatis, 12-20 cm. longis, 4-6 cm. latis, subtus densissime fulvo-pubescentibus supra minutissime molliter vel ad maturitatem glabris, margine undique serrulata, apice longe acuminata, basi obtusa, valde inæquilatera ; nervi subter prominentes ; petioli rigidi, 1 cm.

longi; pedicellis, bracteis, calycibus cum petalisque, fulvo-pubescentibus; flores fasciculatæ, pedunculi 8 mm. longi. Related to *F. reticulata*, H. B. K. Mapiri, 2,500 ft. (2467).

Saurauja serrata, DC. Prodr. i. 526. Mapiri 5,000 ft. (481.) Possibly specifically distinct from the Mexican plant, but I can see from these specimens no very obvious differences.

Saurauja parviflora, Triana & Planch. l. c. xviii. 268. ex. descriptio. Yungas 6,000 ft. (483.)

SAURAUJA RUSBYI, spec. nova. Caulis debilis, angulatus, hispidis; folia obovata, 15-20 cm. longa, 6-8 cm. lata, utrinque hispida, undique aristo-serrata, apices acuti vel acuminati, basi cuneati; paniculis axillaribus, longe et graciliter peduncularibus, multifloris; floribus 10-15 mm. latis, petalis rotundatis, glabris, calicibus et pedicellis breviter hirsutis; antheræ oblongæ, loculis apice poro dehiscentibus. Yungas, 6,000 ft. (482.)

Saurauja, near *S. serrata*, perhaps a distinct species. Unduavi, 8,000 ft. (506.)

Laplacea semiserrata, Cambess. in St. Hil. l. c. i. 300. Yungas, 4,000 ft. (485.)

Laplacea Organensis, Planch. in Herb Kew. (Gardner, No. 5680.) Yungas, 6,000 ft. (627.)

Laplacea symplocoides, Planch. & Lind. in Ann. Sci. Nat. l. c. 269. Mapiri, 5,000 ft. (484.)

MALVACEÆ.

Malvastrum Peruvianum (L.), Gray, in Bot. U. S. Expl. Exped. 146. Yungas, 6,000 ft. (1463); Near La Paz, 10,000 ft. (1921).

Malvastrum lobulatum, Wedd. Chlor. And. ii. and in Bull Soc. Bot. France, xii. 82. Near La Paz, 12,000 ft. (1373).

MALVASTRUM RUSBYI, spec. nova. Frutescens; caulis lignescens, 25-30 cm. altus, ramosus; rami juvenales densissime stellato-pubescentes; folia ovato-reniformia, triloba, crenata, stellato-pubescentia lobo terminali longissimo; nervi subter prominentes; petioli graciles 2-4 cm. longes; pedunculis axillaribus, 1-8 cm. longis, multifloris; flores in capitulis congestæ, purpurascentes, 2-3 cm. lat.; invollucello speciose stellato-tomentoso.

Near La Paz, 10,000 ft. (1780 and 1781.) Related to *M. capitatum*, (Cav.).

Euphorbiaceæ Mexicanæ.

By C. F. MILLSPAUGH, M.D.

The following is an enumeration of the Euphorbiaceæ collected in the states of Jalisco, Tamaulipas, and Nuevo Leon by Mr. C. G. Pringle in 1888 :—

EUPHORBIEÆ.

Euphorbia umbellulata, Engelm. in litt., var. MAJOR, var. nov., Branches 5 to 17 cm. long ; leaves 5 to 11 mm. long, 2 to 9 mm. wide ; stipules triangular, hirsute ; cymes 4 to 12 headed ; the floral bracts verticillate on the pedicels and similar to the stipules ; glands orbicular, cup-shaped, stipitate, deep red ; capsules hirsute even in age. Dry slopes of the barranca, near Guadalajara, December 11. (2065).

Euphorbia villifera, Scheele, Linnæa, xxii. 153. Dry rocky places, Sierra Madre, near Monterey, June 28. (2067).

Euphorbia radioloides, Boiss., DC. Prod. Pars xv. p. 45. This plant has the same characters as described for Seemann's No. 1522, but is larger. Dry slopes of the barranca, near Guadalajara, Dec. 11. (2066 in part).

Euphorbia radioloides, vide sup., var. RUBRA, var. nov. This plant is apparently the *E. radioloides (?)* of Watson, Contrib. xiv. 449. Plant 15 to 17 cm. high, of a deep red color throughout, villous with spreading hairs ; appendages entire ; capsules villous upon the keels ; leaves oblong-lanceolate, 3 to 8 mm. long, 1 to 1½ mm. wide ; seeds dark reddish-salmon color. (2066 in part, collected same place and date).

Euphorbia Guadalajarana, Watson, Contrib. xiv. Proc. Am. Acad. xxii., 449. Dry slopes of the barranca near Guadalajara, Dec. 11. (2064). The rediscovery of this beautiful species first collected by Dr. Edward Palmer in shaded ravines of the Rio Blanco, is especially interesting, as Mr. Pringle says : "I only secured four specimens ; it must be very scarce in the region worked by me last fall."

Euphorbia subreniforme, Watson, Contrib. xiii ; Proc. Am. Acad. xxi. 439. Moist banks near Guadalajara, Oct. 30. (2063). Previous finding of this species was at the Hacienda San Jose, state of Chihuahua, by Dr. Palmer and Mr. Frayles.

EUPHORBIA MONTEREYANA, spec. nov. § *Tithymalopsis.* Glabra; radice tenui elongata, caulibus virgatis striatis superned ichotomis; foliis petiolatis, inferiora sparsa, ovato-lanceolata vel nulla, superiora longa, anguste linearia, acuta, margine integri non revoluta; involucris solitariis in axillis supremis terminalibus dichotomialibusque, longe pedunculatis, breviter campanulatis, extus glabris; glandulis 5, transverse ovatis, concavis, viridis, appendice alba ovata integra; capsula glabra longe-pedicellata; semina depressa-punctata.

Scattered thinly through cool, shaded, mossy canons on northern slope of the Sierra Madre near Monterey, June 15. (2069.) Plant 25 to 35 cm. high, branches 10 to 18 cm. long, lower leaves when present 1 to 2 cm. long, 5 to 10 mm. wide, upper leaves 1½ to 8 cm. long, 1 to 5 mm. broad.

Euphorbia campestris, Cham. et Schl. Linn. 1830, p. 84, var. FOLIOSA, var. nov. Leaves very numerous above, oblanceolate mucronate attenuate at the base, sessile, 3 to 7 cm. long, 5 to 10 mm. broad, those at the bifurcation of the rays opposite, ovate, mucronulate, rays of umbel 5, 5½ to 6 cm. long, twice to thrice branching, no teeth between the horns of the glands. Wooded slopes of Sierra Madre near Monterey, June 23. (2068).

CROTONEÆ.

Croton ciliato-glandulosus, Ortega, Plant. rar. hort. matrit., dec. 4, p. 51. River gravel near Monterey, July 7. (1914.)

Croton monanthogynus, Michx., Flor. Bor. Am. ii. 215; (*Gynamblosis monanthogyna*, Torr. in Marcey's Rep. 295). This plant differs from the description in that it has a one-celled capsule splitting into four equal valves, four styles, and only one seed to each capsule. *C. monanthogynus* is often by abortion one-celled and one-seeded, but the specimens in this collection are constant as described. Fields, valley near Monterey, July 7. (1913).

ACALYPHEÆ.

Argyrothamnia serrata, Muell. Arg. l.c. 147. (*Aphora serrata*, Torr. Mex. Bound. Survey, 197.) Sierra Madre near Monterey, June 16. (2075).

Acalypha hederacea, Torr. l. c. 200. (*Acalypha hederacea, a*

genuina, Muell, Arg. l. c. 885.) River gravel near Monterey, July 4. (1915).

HIPPOMANEÆ.

Stillingia Torreyana, Watson, Bot. Calif. ii. 72. Fields near San Miguel, State of Tamaulipas, July 30. (2071).

Stillingia Zelayensis, Muell. Arg. in Linn. xxxii. 87. ? Differs from the original description in the same features that Watson notes (Contrib. xiv. 451) in a specimen gathered by Dr. Edward Palmer on Rio Blanco, Jalisco, 1886. Hills near Monterey, June 7. (2070).

Aster cordifolius, L. and Two New Varieties.

This, the most common and abundant *Aster* of our Eastern flora, blooming everywhere profusely during the months of September and October, like others of the genus, is subject to great variation. It exhibits, however, three distinct and dominant lines of development, each of which deserves recognition. If a characteristic specimen of the first variety named below were placed beside one of the typical form, the intermediate links that connect them being unknown, it would be accepted without hesitation as a good species, which, perhaps, it is. Even where found growing together, they are readily distinguished by the practised eye.

Aster cordifolius, L., (typical).—Leaves thin, membranaceous, strongly scabrous-pubescent, serratures mostly large, sharp-pointed and spreading; cauline ones round-cordate to cordate, on naked or barely-margined petioles; uppermost ovate; panicle ample; heads of flowers very numerous, variable in size, 2 to 3 lines high; rays light blue to deep violet; disk-florets yellowish or purple (as in some other species of the genus), both kinds often in the same head.

Aster cordifolius, L., var. LÆVIGATUS, new var.—Leaves thickish to coriaceous, pale green, often glaucous beneath, in texture and smoothness like those of *A. lævis*, but generally supplied with a very sparse, minute, somewhat roughish pubescence, serratures more or less appressed; cauline ones cordate to oblong-cordate, on petioles with broad or narrow winged-margins; uppermost lance-ovate to lanceolate; panicle open and loose; heads of flowers comparatively few, variable in size, but mostly larger than in the type; rays light blue.

Common in New Jersey and Pennsylvania, as well as westward and southward.

Aster cordifolius, L., var. LANCEOLATUS, new var.—Leaves deep green on both sides, thin, smooth, faintly scabrous, serratures appressed, sometimes nearly obsolete; cauline ones lance-ovate to narrowly lanceolate, tapering into a long acumination, the cordate sinus almost or quite filled up; uppermost narrower. In other respects like the preceding.

Along Chestnut Hill, Easton, Pa., in the deep shade of woods. Also collected on Staten Island by Dr. N. L. Britton and at White Plains, N. Y., by Miss McCabe.

Some of the features in these two varieties might suggest hybridization with *A. lævis*, but the frequent occurrence of the first over so wide an area, and at points where *A. lævis* does not exist, forbids the supposition.

THOS. C. PORTER.

On Elastic Stamens in Compositæ.*

In the Proceedings of the Academy of Natural Sciences of Philadelphia, 1883, I have noted that the filaments of some flowers of the thistle alliance are elastic. The stamens in the united column mature their growth before the pistil becomes fully elongated, and which, unable to push through the column, bears it upon its apex, until the downward pressure is so great that the pistil bursts through, when the elastic filaments at once draw the anthers down to their proper position on a level with the limb of the corolla. I had supposed that so obvious a behavior in the stamens of these plants and those of other Compositæ, would be matters of record,—but with the exception of what has been written on the irritable filaments (see Sachs' Text-book, pp. 787-797) no note seems to have been made. I was pleased to find, on introducing the subject before the combined British and

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* Read before the Botanical Club of the A. A. A. S. Cleveland Meeting, 1888.

American Associations in Philadelphia in 1884, the whole subject seemed new and interesting to the many distinguished botanists present.

I desire now to add that, in the years that have followed, I note that this condition is quite common among Compositæ. It would be more easy to give a list of species in which it does not exist, than where it does. *Heliopsis* is, however, one of the best illustrations (*H. lævis*, *H. scaber*), as the anther-tube is so very long, and the filaments must be drawn out before they contract on the emergence of the pistil, to a length greater than in many other species.

At the time I refer to, some of the distinguished botanists present, conceding the renewed interest my observations threw around the subject, were not quite prepared to accept the "elastic" view of the filaments,—the interesting and repeated observations of the botanists cited by Sachs' seeming to give to irritability alone power to accomplish all the phenomena. I have since made an observation on *Helianthus* (*H. doronicoides*) which clearly establishes the fact that the anther-column is not pushed up, and again drawn down by irritable action in the filaments, but is simply pushed up by the growth of the pistil, and drawn down by the elastic filaments as soon as the apex of the pistil manages to escape. In this *Helianthus* the anthers are but lightly coherent, and the pistil has an evident tendency to a lateral instead of the usual erect tendency. It breaks through the side of the anther-column, and the anthers themselves mostly get free from their usual contact with each other before they have been drawn far above the limb of the floret. In this case there is no attempt at elongation, while there is no reason why there should not be as in the other cases, if irritability in the filaments were the active cause.

THOMAS MEEHAN.

Additions to the Iowa Flora.

The following is a list of additions to the Anthophyte flora of Iowa founded upon Dr. J. C. Arthur's "Contributions to the Flora of Iowa." I owe many thanks to Dr. Sereno Watson and Dr. Geo. Vasey, for assistance in determining some of the species.

Linum rigidum, Pursh. Sioux City.

Astragalus lotiflorus, Hook., var. *brachypus*, Gray. Hamburg, Fremont Co.

Petalostemon villosus, Nutt. Ames.

Psoralea lanceolata, Pursh. Sioux City.

Trifolium agrarium, L. Ames.

Potentilla Anserina, L. Jewell Junction, Hamilton Co.

Rosa lucida, Ehrh. Iowa City.

Cnicus altissimus, Willd., var. *filipendulus*, Gray. Sioux City.

Coreopsis tinctoria, Nutt. Shenandoah, Page Co.

Tragopogon pratensis, L. Iowa City.

Lysimachia nummularia, L. Iowa City.

Ipomœa pandurata, (L.) Meyer. Iowa City.

Hyoscyamus niger, L. Iowa City.

Plantago Patagonica, Jacq., var. *aristata* (Michx.) Gray. Van Wert, Decatur Co.

Atriplex patula, L., var. *littoralis* (L.) Gray. Iowa City.

Cycloloma platyphyllum, Moq. Des Moines.

Salsola Kali, L. Sioux City.

Shepherdia argentea, Nutt. Sioux City.

Bœhmeria cylindrica (L.) Willd. Iowa City.

Heteranthera limosa, Vahl. Hamburg.

Tradescantia Virginica, L., var. *flexuosa* (Riddell) Wats. Iowa City.

Echinodorus rostratus, Engelm. Hamburg.

Carex trichocarpa, Muhl., var. *aristata* (R. Br.), Bailey. Iowa City.

Agropyrum glaucum, R & S. Lake Okoboji, Dickinson Co.

Agropyrum unilaterale, V. & S. Lake Okoboji.

Eragrostis Purshii, Schrad. (So called.) Common.

Melica Porteri, Scribn. Iowa City.

Paspalum setaceum, Michx. Iowa City.

Phalaris Canariensis, L. Sioux City.

Setaria verticillata (L.) Beauv. Iowa City.

Stipa comata, Trin. Sioux City.

Triplasis purpurea (Walt.) Chapm. Iowa City.

Tripsacum dactyloides, L. Van Wert. A. S. HITCHCOCK.

STATE UNIVESITY OF IOWA.

On a Fossil Marine Diatomaceous Deposit from Atlantic City, N. J.

By C. Henry Kain and E. A. Schultze.

(Plate LXXXIX).

In sinking the second artesian well at Atlantic City, N. J., there has recently been discovered a fossil diatomaceous deposit of exceeding interest, not only to the student of diatoms, but to the geologist as well. By comparing the species found in it with those found in the famous deposits of Maryland and Virginia, a striking similarity will be observed. It is not the purpose of the present paper, however, to deal with the general geological results, especially as Mr. Lewis Woolman, the discoverer of the deposit, will make a full report to the Philadelphia Academy of Natural Sciences, upon the completion of the well. Mr. Woolman made a report upon the geological results observed in sinking the first well, which was begun in 1886, but, desiring to make a more accurate examination of the character of the successive strata, when the second well was contemplated he made arrangements to obtain a complete series of earth specimens. In a stratum of clay which was struck at a depth of 387 feet, he discovered diatoms, and, at his request, the investigation, of which this is a record, was immediately undertaken with a view of determining the species found.

Thus far, the diatoms have been found in a series of six clay beds occurring between the depths of 387 and 638 feet. These beds are separated by layers of sand in which no diatoms occur. The diatoms found in the upper stratum are few in number, generally small in form and much broken. At a depth of 406 feet the deposit is much richer, and several interesting species not found in the lower strata are fairly plentiful, such as *Dimeregramma Nova Cæsaræa*, *Auliscus spinosus*, and *Rhabdonema Atlanticum*. *Triceratium semicirculare* is particularly abundant at this depth, although it is also found to some extent in the deeper strata. The richest portion of the deposit, however, is at a depth of 550 feet. Here occurs for the first time a very curious new form, which we have provisionally called *Biddulphia Brittoniana*, although Prof. H. L. Smith is doubtful whether it is not really a new genus. A further examination of other specimens will be necessary to determine its true character. Here also we find the deposit rich in specimens of *Biddulphia Tuomeyi*, *Biddulphia elegans* and several species of *Rhaphoneis*. Not only is the deposit much richer at this depth, but the forms are also far more robust than in the upper strata. Below 550 feet the diatoms become fewer and less interesting, until at a depth of 638 feet only a few of the larger species of *Coscinodiscus* may be found.

After the well had reached a depth of about 800 feet, a severe storm destroyed the apparatus employed in sinking it, but the boring will probably be resumed, and it is intended to make a complete microscopical examination of the remaining strata. The well will probably reach a depth of 1,150 feet, the first well having been completed at about that depth.

In examining the list of species, it will be observed that there are a few fresh water forms. These are not plentiful, but are sufficient to indicate that the deposits were made within the reach of fresh water influences, possibly within or not far from a large estuary. While, as before stated, the similarity between the species in this and in the deposits of Maryland and Virginia is remarkable, it is also a curious fact that the characteristic species of the Nottingham, Md. deposit—*Heliopelta Ehrenbergii* and *Craspedodiscus elegans*—are conspicuously absent. The presence of *Hydrosera triquetra* is also rather interesting, as this is usually supposed to be peculiar to tropical seas.

The following is a list of the species thus far observed:

Actinocyclus Ehrenbergii, Ralfs. Several varieties.

A. interpunctatus, Brightw. Rare.

A. Ralfsii, W. Sm.

ACTINODISCUS ATLANTICUS, n. sp. Kain and Schultze.

Greville, who constituted this genus, described and figured but one species, *A. Barbadensis*. He gives the following generic characteristics: "Frustules free, disk-shaped; valves granular with a central nucleus, and numerous (15) linear, smooth, rays extending from it to the margin." In this deposit the specimens differ in the following respects from Greville's figure. The central nucleus is much smaller; the rays extend nearer to the centre of the valve and are either four, five or six in number. Near the circumference each ray has a strong rib extending for a short distance along its centre, and the spaces between the rays are slightly undulating.

Actinoptychus areolatus, Ehrb.

A. splendens (Ehrb.), Grun., *var. Halionyx*, Grun. Several varieties.

A. undulatus, Ehrb.

A. vulgaris, Schumann, *var. Virginica*, Grun. Several varieties.

Amphitetras minuta, Grev. Rare.

Asterolampra Marylandica, Ehrb. Rare.

Aulacodiscus Crux, Ehrb. Two varieties.

Auliscus pruinosus, Bailey.

A. spinosus, T. Christian. A. Schmidt (Atlas Pl. 125, fig. 2) speaks of this as doubtfully an *Auliscus*, and Prof. H. L. Smith considers it rather more closely allied to *Glyphodiscus*, although he thinks the two genera might with propriety be united.

Biddulphia aurita (Lyngb.), Breb.

B. Baileyi, W. Sm.

BIDDULPHIA BRITTONIANA, Kain and Schultze, n. sp.

A figure and description of this singular new form will be given in a future paper.

BIDDULPHIA COOKIANA, Kain and Schultze, n. sp.

Valve orbicular-lanceolate; two processes at extremities of longitudinal axis; three central spines; elevation at the centre and apices slight; striæ moniliform, radiate. (Plate LXXXIX. Fig. 4).

We take pleasure in naming this beautiful form after Prof. Geo. H. Cook, State Geologist of New Jersey.

B. decipiens, Grun. Rare.

B. elegantula, Grev. A careful study of the many varieties of this diatom found in the deposit, and a comparison of them with *B. Tuomeyi*, also found in it, make it seem probable that they are only varieties of the same species.

B. pulchella, Gray. Rare.

B. rhombus (Ehrb.), W. Sm.

B. seticulosa, Grun.

B. Tuomeyi, Bailey.

B. turgida (Ehrb.), W. Sm.

BIDDULPHIA WOOLMANII, Kain and Schultze, n. sp.

Valve elliptical, with undulating margin caused by from 7 to 10 transverse elevations separated by costæ, the summits of which are finely punctate, and the marginal inclinations finely striate; processes globular. (Plate LXXXIX. Fig. 3).

Cocconema lanceolatum, Ehrb. Rare.

Coscinodiscus Argus, Ehrb.

C. asteromphalus, Ehrb.

C. concavus, Ehrb.

C. eccentricus, Ehrb.

C. gigas, Ehrb.

C. isoporus, Ehrb.

C. Lewisianus, Grev. Rare.

C. lineatus, Ehrb.

C. Nottinghamensis, Grun. Rare.

C. Oculis Iridis, Ehrb.

C. perforatus, Ehrb.

C. radiatus, Ehrb.

C. rhombicus, Castracane. Rare.

C. robustus, Grev.

C. Senarius, A. S.

C. symmetricus, Grev.

Craspedodiscus coscinodiscus, Ehrb.

C. coscinodiscus, Ehrb., var. *Nankoorensis*, Grun.

Cymatopleura Solea, W. Sm.

Dicladia capreolus, Ehrb. Rare.

DIMEREGRAMMA NOVÆ-CÆSARÆA, Kain and Schultze, n. sp.

Valve linear with slight central inflation and acute apices; striæ moniliform, marginal; intermediate free space broad. (Plate LXXXIX, Figs. 1, 1b).

D. NOVÆ-CÆSARÆA, var. OBTUSA, Kain and Schultze, n. var.

Valve linear with central inflation and obtuse constricted extremities; striæ moniliform, marginal, broad intermediate free space. (Plate LXXXIX. Figs. 1a, 1b).

D. fulvum (Greg.), Ralfs.

Ethmodiscus? sp.? Fragments of a very large disk are common at 550 feet, which probably belong to a species of this new genus constituted by Castracane.

Eucampia Virginica, Grun. Rare.

Eunotia monodon, Ehrb. Two varieties.

E. robusta (Ehrb.), Ralfs. Several varieties.

Eupodiscus Rogersii, Ehrb. Specimens are found with 3, 4 or 5 processes, but those with three are most frequent.

Eupodiscus sp.?

Goniothecium odontella, Ehrb.

G. Rogersii, Ehrb.

Grammatophora serpentina, Ehrb., var. Rare.

Hyalodiscus stelliger, Bailey. (*Podosira maculata*, W. Sm.)

Hydrosera triquetra, Wallich.

Mastogonia actinoptychus, Ehrb.

Melosira sulcata (Ehrb), Kutz.

Navicula crabro, Ehrb.

N. didyma, Ehrb.

N. elliptica, Kutz.

N. entomon, Ehrb.

N. forcipata, Grev.

N. gracilis (Ehrb.), Kutz.

N. Hennedyi, W. Sm.

N. major, Kutz. Rare.

N. permagna, Bailey.

N. prætexta, Ehrb.

NAVICULA SCHULTZEI, Kain, n. sp.

Valve broadly elliptical; intermediate free space expanded around the central nodule; striæ coarsely moniliform, convergent opposite the central nodule and radiate towards the apices. (Plate LXXXIX. Fig. 2).

N. viridis, Kutz. Rare.

Pleurosigma Virginiacum, Peticolas.

Pleurosigma sp.? Fragments of a very large *Pleurosigma*, allied to *P. angulatum* are occasionally found.

Pseud-auliscus radiatus, Bailey.

Pyxidicula cruciata, Ehrb.

RHABDONEMA ATLANTICUM, Kain and Schultze, n. sp.

Valve narrow, linear elliptic; frustule with two median and two marginal septæ, the former more curved and conspicuous than the latter; striæ transverse, fine. (Plate LXXXIX. Figs. 7, 7a).

Rhaphoneis amphiceros, Ehrb.
R. Belgica, Grun.
R. fluminensis, Grun.
R. scalaris, Ehrb.

The deposit is particularly rich in specimens of *Rhaphoneis*, and these present such variations of structure as to suggest the advisability of decreasing the number of species usually considered as belonging to the genus.

Rhizosolenia Americana, Ehrb.
R. styliformis, Brightw.
Sceptroneis Caduceus, Ehrb.
Stephanogonia actinoptychus, Ehrb.
S. polygona, Ehrb.
Stephanopyxis apiculata, Ehrb.
S. ferox (Grev.), Ralfs.
S. corona (Ehr.), Grun.
S. limbata, Ehrb. Rare.
S. Turris (Grev.), Ralfs.
Surirella Febigerii, Lewis.
Terpsinœ sp.?
Triceratium Americanum, Ralfs.
T. condecorum, Brightw.
T. Fischerii, A. S.

TRICERATIUM KAINII, Schultze, n. sp.

Valve triangular with concave margins; striation moniliform, convergent towards the centre and intercepted by three costæ equidistant between the rounded angles and the unstriated centre. (Plate LXXXIX. Fig 5).

T. Marylandicum, Brightw.
T. obtusum, Ehrb.
T. robustum, Grev.
T. semicirculare, Brightw. (*Euodia Brightwellii*, Ralfs). (Plate LXXXIX. Figs. 6, 6a).
T. spinosum, Bailey.
T. Solenoceros, Ehrb. Rare.
T. tessellatum, Grev.
T. undulatum, Ehrb.

In a future paper it is proposed to figure and describe several other new species peculiar to the deposit.

The Ideal Ovary.

The typical flower was held, not so very long ago, to have four successive alternating whorls, of sepals, petals, stamens and carpels. In the Structural Botany (1879, p. 177) Gray cautiously concludes that the "typical flower in nature has two series of stamens, as it has two series in the perianth." For some years past I have also believed in two whorls of carpels as essential to the true conception of the typical flower, but have hesitated to advance this view lest it should be deemed too theoretical. Now I am gratified to find, in the Origin of Floral Structures (1888, p. 4), Prof. Henslow's typical flower represented as having "two whorls of carpels forming the gynœcium." Moreover, that shrewd botanical thinker, Robert Brown, is cited as having come to the same conclusion. Brown's reasons are not given. Prof. Henslow seems to have been mainly influenced by observing that the carpels are sometimes anteposed to the sepals and sometimes to the petals, an incongruity most easily explained by assuming two whorls, of which either one may be suppressed. I reached a like conclusion by quite another road, namely, by observation of the structure of the common orange. Excluding the external rind altogether this fruit presents a series of complete closed, thin-walled carpels, readily susceptible of septicidal separation. The rind appears wholly extraneous and accessory to these, and it occured to me that the structure could be most plausibly and perfectly explained by assuming an outer whorl of barren carpels, united by their edges in the fashion of a polycarpellary one-celled ovary, and degraded to form a mere envelope for the normal seminiferous carpels within. Under this view these outer carpels are closely analogous to staminodia, being sexual organs in origin and position but stripped of their normal function. *Apropos* of the orange I may add here the observation that the stalked, elongated, juice-filled cells of the pulp, springing from the inner surface of the carpellary leaf, are true trichomes in structure and position, and therefore, when we revel in the fruit of *Citrus Aurantium*, we are, morphologically speaking, simply eating hairs !

E. E. STERNS.

Botanical Notes.

A Proposed Flora of Mt. Desert. For some years past an Annotated Catalogue of the Plants of Mt. Desert Island, Maine, has been in active preparation by a number of botanists interested in the flora of the island. As Mt. Desert is in many ways a central and representative station for the Maine coast, it is believed that the publication of such a catalogue will be of both botanical and general interest. The undertaking is made especially difficult, however, by many unfavorable circumstances,—such as the lack of resident botanists, and the impracticability of carrying on work except in the summer months. It is evident therefore that much dependence must be placed on the assistance of all botanists who at any time may chance to visit the island. Communications from any such observers, any lists of species seen or collected by them, and any facts of interest regarding the flora may be sent to, and will be gratefully received by Edward L. Rand, 27 State St., Boston, Mass., or John H. Redfield, 216 West Logan Square, Philadelphia, Pa.

Professor R. A. Philippi, the distinguished Chilian naturalist, has completed his eightieth year, his birthday on September 14th having been appropriately celebrated in Santiago. From a somewhat extended account of his life and labors which appeared in the "Centralblatt" of December 31st, we learn that he is of purely German descent, and was born in Charlottenburg in 1808. His doctorate was bestowed by the Friedrich Wilhelms University in 1830. Soon afterwards he visited Italy, and spent considerable time at intervals in Sicily, where he wrote a work on the Flora of Mt. Etna. For some years he was a teacher of Botany and Zoology in Cassel. For political reasons he went to Chili about 1851, was instrumental in founding the Lyceum at Valdivia in 1853, and has since been associated with all Chilian scientific matters Since 1874 he has been director of the Santiago Museum, and is by far the most learned naturalist in South America. His son, Fred. Philippi, is Professor in the University, and Director of the Botanical Garden at Santiago.

The III and IV Decades of American Hepaticæ have been recently received and among them the following are specially desirable: *Aneura latifrons*, *Pellia endiviæfolia*, *Radula spicata*, *Porella Bolanderi* and *Diplophyllum albicans*. The accompanying circular also announces that but one set remains of decades I and II. Prof. Underwood and Mr. Cook are to be congratulated on having supplied such desirable exsiccatæ. E. G. B.

Raspberry and Blackberry. In vol. xxxiv. No. 890 of "The Garden," C. H. Engleheart contributes a note in regard to a hybrid between the raspberry and blackberry, growing wild near Lynton, North Devon. The fruit is described as long, mulberry colored, and with a taste intermediate between that of the two parents.

Reviews of Foreign Literature.

At a recent meeting of the Botanical Society in Munich, Prof. Hartig gave the results of some experiments on the red beech, in reference to the influence of seed production on the increase in growth and the reserve material of the tree. According to these results, he believes the present accepted theory in regard to the use made by the tree of its reserve-stores is entirely incorrect. This theory, briefly stated, is as follows: A large part of the carbohydrates stored away as starch grains in the outer annual wood layers is used every year as material in forming the new leaves, stems, and annual wood and phloem rings. Prof. Hartig claims to have proven that in case of the red beech only a small portion of the yearly increase of the tree is due to the reserve material, but by far the larger part to the products of assimilation of the same year.

Certain experiments showed that the entire reserve material of carbohydrates in trees of fifty years of age was sufficient to furnish only about five per cent. of the yearly increase of the trees. Other experiments tried on trees of one hundred and one hundred and fifty years, just before a seed-bearing summer, proved them to contain twenty per cent. of the yearly increase. This was proven by taking off the whole number of branches so that during the entire summer not a single leaf was present to manufacture new carbohydrates, and so the tree was obliged to use its reserve material for the annual ring. In the fall the trees were examined, and the above results as to increase in growth were obtained, also the fact, that while nearly every vestige of starch had been used up by the cambium layer, the amount of nitrogenous matter in the woody tissues was not less than that of normally growing trees.

Prof. Hartig suggests the following explanation of these facts: In normally acting trees, the cambium possesses only a slight power of dissolving and attracting to itself the reserve material within the tree, its need of nourishing matter being satisfied by the supply brought to it by the inner sieve tubes of the rind. When this supply is no longer furnished, as in case of the trees deprived of their smaller branches, the hungry cambium possesses a strong power of attraction, by which it is enabled to draw out the entire store of reserve material. Now, as it is quite evident the extra amount of reserve material is not designed for pathological purposes, it suggested itself to him that it was for the purpose of producing a large supply of seeds, and that the periodical recurrence of seed and not seed years was due to the respective amounts of reserve stores in the tree. A number of interesting experiments are given by which this assumption was fully corroborated. Our space does not allow the citation of these, but the reader is referred to the article itself, in the Botanisches Centralblatt, Vol. 36, No. 13, 1888. It must be mentioned, however, that in conclusion, Prof. Hartig admits the desirability of similar tests being applied to other trees before making the statement too general, yet he says it is not probable that the red beech would prove an exception as to its use of reserve material.

E. L. G.

Hymenoconidium petasatum is the name of a new and remarkable fungus, discovered by Hugo Zukal of Vienna, and described by him in a late number of the Botanische Zeitung.* Some olive branches with half-grown fruit had been sent him from Fiume, with the question as to the cause of the diseased condition of the tree from which the branches were taken. On the fruit appeared separate spots of a wrinkled, discolored appearance, and between

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***January 25, 1889.**

the wrinkles rose little projections no larger than a pin-head. The same were found on the leaves, more frequently on the under than the upper side. On examination, these were found to be little cushions of mycelium threads immediately under the epidermal layer. These threads were thin-walled, septate, and filled with minute oil drops; from this cushion extended little rhizoid projections into the spaces between the parenchyma of the host which sent haustoria into these cells. The protoplasm of these cells was contracted and discolored, and the cell showed other appearances of injury. In all respects the fungus and its effects on the host appeared like that of some of the family of the Uredineæ.

In order to discover what the further development might be, the end of the branch was fresh cut and placed in water under a bell jar. Not until after six weeks, and when certain portions of the olive fruit had decayed, was any change perceptible. Then the fungus began a further development, the mycelium threads lying next the epidermis sent up numerous little tubes parallel with each other and at right angles to the hyphæ branches, thus forming a sort of hymenial layer. These tubes, at first slender, afterward swelled out into oval shaped bodies. The epidermis was soon broken, leaving these exposed to the outside air. Soon after this stage, a cross wall formed in many of these tubes, cut off the swollen part, which after a short time developed into a pear-shaped spore, was provided with a roughened outer coat and finally separated itself from the rest of the plant. The remaining tubes appeared like ordinary paraphyses growing up thickly about the spores and projecting above them.

But the most remarkable part of the development is yet to come. Just after the hymenial layer originates and the spore tubes begin to assume their characteristic form, the whole mycelium cushion begins to undergo a rapid series of changes, by which it is transformed into a bundle of densely wound hyphæ. That portion of these directly under the central part of the hymenial layer send out branches downward which, growing rapidly at right angles to the surface, interweaving with each other and growing together, form the beginning of a stem whose growth is arrested at this stage, till the hymenial layer is well organized and the spores started. Then the stem grows up rapidly to the height of from one to four centimeters, bearing with it at its summit the whole of the rest of the fungus, now developed into the hat or umbrella shape which marks so large a class of the Hymenomycetes. A number of glandular hairs have developed meanwhile on the under side of the hat, which secrete a fluid collecting about its base in a large clear drop.

The fungus is exceedingly sensitive to light, being positively heliotropic. The building of the stem sometimes fails, either partially or entirely, but even in the latter case the spores ripen quite normally. The hymenium then is very similar to the stylospore clusters of the Uredineæ.

Finally the author remarks that he has been unable, as yet, to bring the spores to germination. It is therefore impossible to say whether these may be considered the highest fruit-form of a distinct and independent fungus, or simply conidial forms whose farther development would result in some (yet unknown) higher form. He inclines to the first opinion and thinks the fungus is one of the Hymenomycetes of an extremely simple structure, whose basidia bearing tubes have not reached their full development.

E. L. G.

An article by G. Haberland, in Flora, on the chlorophyll bodies of the Selaginelleæ gives several new points in relation to these bodies, particularly in regard to their form and external appearance. In the assimilating cells of many species there is only a single chlorophyll body, described as tray or trough-shaped, (muldenforming) which corresponds perfectly with the chloroplastids of higher plants. Near the base of the leaf the cell contains one chlorophyll grain of a very irregular shape, or in some cases there are several quite unlike in form. In the parenchymatic cells of the rind of the stem were found numerous spindle-shaped chloroplastids which were bound to each other by fine, colorless protoplasmic threads so there was a continuous chain of these bodies in each cell. Some of these were changed into Leucoplastids, distinguished from the former by being smaller and colorless. In reference to the origin of the chlorophyll body, he says it occurs in the meristem of the apical region. Owing to the position of the chloroplastids with reference to the cell nucleus, he draws the conclusion that the latter plays an important part in the formation of starch. E. L. G.

Beiträge zur Kenntniss der Cyperaceen. Heft I., Cyperaceæ novæ. O. Boeckeler, (pamphlet, pp. 53. Varel-an-der-Jade, 1888.)

Descriptions of 110 species of Cyperaceæ are given in this latest contribution by Herr Boeckeler. They are divided among the genera as follows: *Kyllingia* 1; *Cyperus* 24; *Heleocharis* 14; *Scirpus* 5; *Fuirena* 1; *Liphocarpha* 2; *Hypolytrum* 4; *Rhynchospora* 16; *Leptolepis*, a new genus, 1; *Cryptangium* 2; *Scleria* 11; *Homalostachys*, new genus, 1; *Trilepis* 1; *Kobresia* 3; *Carex* 24. None of them are North American, but several are from the West Indies, Colombia and Argentina.

Zur Kenntniss der Gattung Scirpus. Dr. Ed. Palla. (Engler's Bot. Jahrb., x., 293–301).

Herr Palla publishes the results of observations on the arrangement of fibro-vascular bundles in the stem of numerous species of genera in the tribe Scirpeæ, as affording characters for classification. As of interest to American botanists, a few of his conclusions may here be given The genus *Dichostylis* of Beauvois is revived, and in it are placed certain species which have been described as *Cyperus*, *Scirpus* and *Fimbristylis*, including our *Cyperus Baldwinii*, *C. aristatus* and *Fimbristylis congesta*—rather diverse elements, we should say, *Trichophorum*, Pers., is brought into use for *Eriophorum alpinum* and *Scirpus cæspitosus*, *Scirpus*, L., is retained for *S. sylvaticus*, *S. atrovirens* and *Eriophorum cyperinum*, and the author thinks that *S. maritimus* and *S. fluviatilis* may also belong there; *Blysmus*, Panzer, is kept up as a genus. *Schœnoplectus*, Reich., includes *Scirpus Olneyi*, *S. Tatora*, *S. lacustris*, *S. pungens*, *S. mucronatus* and *S. supinus*. *Eleocharis*, R. Br., is accepted very much as we know it. *Isolepis*, R. Br., includes *Scirpus carinatus* and *Websteria fluitans*.

N L. B.

Index to Recent American Botanical Literature.

Adiantum pedatum (Garden, xxxv. 105, illustrated.)

Botanic Garden in New York—Proposed Public. (Med. Rec. xxxv. 129, 130.) An appeal for the project from a medical standpoint.

Botanical Garden—The New York.—H. H. Rusby. (Pharm. Rec. ix. 41.) The importance of a botanical garden for the pharmacist is specially urged.

Botany in the University of Pennsylvania. (Bot. Gazette, xiv. 1-5; five plates.)

Botany of the United States Expedition to Lady Franklin Bay, Grinnell Land.—A. W. Greely. (International Polar Exp., Report of Proceedings, vol. ii. pp. 11-18. Washington, 1888.)

An enumeration of the species collected, with notes on habitat and distribution. The determinations of the flowering plants were made chiefly by Drs. Gray and Watson, and the Mosses and Lichens named by Rev. E. Lehnert. 69 flowering plants and ferns, 63 Bryophytes and 7 Lichens compose the list. *Puccinia Cheiranthi*, Ellis and Everhart, a new fungus, is described in a foot note. It was collected on leaves of *Cheiranthus pygmæus.*

Brickellia Knappiana.—Elmer C. Drew. (Pittonia, i. 260.) A new species from near the Mohave River, California.

Brownea macrophylla.—J. D. Hooker. (Bot. Mag. Tab. 7033.)

Bulletin from the Laboratories of Natural History of the State University of Iowa, I. (Pamphlet, pp. 96, Iowa City, 1888.)

This first number of a new publication contains the commencement of a proposed series of papers on the Saprophytic Fungi of Eastern Iowa, by Prof. T. H. McBride, describing twenty-four species of *Agaricus*; a paper on the Peronosporæ of Iowa by Professors McBride and Hitchcock, and miscellaneous notes.

Ceanothus, L., with an enumerated List and Notes and Descriptions of several Pacific Coast Species.—C. C. Parry. (Proc.

Davenport Acad. Sci. v. 162-174; advance sheets issued Feb. 9, 1889.)

Dr. Parry goes over the ground recently exploited by Professor Trelease, and finds some things in which to differ from that author, the most important of which, from the standpoint of systematic arrangement, is the reference of *C. Palmeri*, Trel. and *C. parvifolius*, Trel. back to *C. integerrimus*, H. & A. As Professor Greene has suggested (Pittonia, i. 246), more species exist than those characterized by Prof. Trelease, and Dr. Parry supplies some, at least, of the omissions by describing *C. intricatus*, *C. Andersoni*, *C. divergens* and *C. foliosus* as new. His general observations on the morphology and habits of the species are interesting and valuable, special attention being given to the fact noted by Prof. Greene, (l. c. 247), that most of the West Coast species flower from the old wood and not from that of the season.

Cereus Pringlei.—C. S. Sargent. (Garden and Forest, ii. 64, Fig. 92.)

Chorizanthe, R. Br.—Review of certain Species heretofore improperly characterized or wrongly referred, with two new Species.—C. C. Parry. (Proc. Davenport Acad. Sci. v. 174-176, advance sheets issued Feb. 9.) *C. robusta*, *C. Douglasii*, Parry, not Benth.), and *C. Andersoni* are described.

Coffee Tree—The Kentucky.—C. S. Sargent. (Garden and Forest ii. 75, 76, fig. 94.)

An interesting account of *Gymnocladus*, with a good illustration of the individual tree at Fishkill-on-Hudson, on the old Verplanck estate. We note, with satisfaction, that Professor Sargent accepts the old name *dioica* given to the tree by Linnæus, and rejects the later one of *Canadensis* by Lamarck. In catalogues and manuals the binomial should stand, *Gymnocladus dioicus* (L.), Koch.

Contributions to American Botany.—XVI.—Sereno Watson. (Proc. Amer. Acad. Arts and Sci., xxiv. 37-87.)

This includes the enumeration of Dr. Palmer's Mexican collection of 1887, made about Guaymas, at Muleje and Los Angeles in Lower California, and on the Island of San Pedro Martin in the Gulf of California. 415 native species are contained in the collection, and of these 89, or more than one-fifth, are described as new; two species are added to *Horsfordia*, two to *Prosopis*, *Malperia* and *Pelucha* are new Composite genera and *Pattalias* is a new genus of Asclepiadeæ; there are four new species and a variety of *Boerhaavia*, three of *Ficus* and a palm—*Washingtonia Sonoræ*—found in secluded canons in the mountains about Guaymas; Professor Eaton determined the ferns and Dr. Vasey the Gramineæ. The following new species of plants are also described:—*Silene Bernardina*, *Erigeron sanctarum*, *Bæria Parishii*, *Bahia Palmeri*, *Collinsia Wrightii*, *Mimulus deflexus*, *Eriogonum Esmeraldense*, *E. gracilipes*, *Allium hyalinum*, Cur. and *Nemastylis Pringlei*; all but the last from California and Nevada. Dr. Watson contends for two East American species of *Sisyrinchium*, *S. angustifolium*, Mill. (*S. mucronatum*, Michx.), and *S. anceps*, Cav.

Cork-wings on certain Trees—Development of IV–V.—Emily L. Gregory. (Bot. Gazette, xiv. 5-10, 37-44.)

Epiphegus Virginiana, *Bart.*—C. F. Millspaugh, M. D. (Homœopathic Recorder, iv. 10.) With plate, and an account of uses in homœopathic practice.

Forests and Woodlands of New Jersey, II. III.—J. B. Harrison. (Garden and Forest, ii. 45, 46-57.)

A continuation of the preceding interesting excerpt from the advance sheets of the report of the New Jersey Geological Survey. The author makes the guarded statement, in regard to *Schizæa pusilla* in the Pine Barrens, that he believes it is found nowhere else in the world!

Forests of the Rocky Mountains. (Garden and Forest, ii. 69.)

Flora of Montebello, Quebec, Estate of the Hon. Mr. Papineau—Notes on the.—Henry R. Ami. (Can. Rec. of Science. iii. 315-318; also reprinted.)

A list of seventy-six species and varieties of plants, found growing independent of cultivation on the estate of Mr. L. P. Papineau and in the adjoining village of Montebello.

Fossil Plants—Recent determinations of, from Kentucky, Louisiana, Oregon, California, Alaska, Greenland, etc., with de-

scriptions of new Species.—Leo Lesquereux. (Proc. U. S. Nat. Mus. xi. 11-38, plates iv-xvi.)

Fossil Plants—Specimens of, collected at Golden, Colorado, 1883, *for the Museum of Comparative Zoölogy, at Cambridge, Mass., examined and determined by Leo Lesquereux.* (Bull. Mus. Comp. Zool., Cambridge, Mass., Dec., 1888.)

Twenty-eight new species are described in the total enumeration of 117. The genus *Ficus*, is, as usual, well represented—twelve species being placed in this genus, three of which are described as new.

King Devil (*Hieracium prœaltum*).—Lester F. Ward. (Bot. Gaz. xiv. 10-17).

Ilex Amelanchier.—C. S. Sargent. (Garden and Forest, ii. 40, Fig. 88).

Lichenes Spegazziniani in Staten Island, Fuegia et in regione Freti Magellanici lecti.—J. Mueller. (Nuevo Giornale Bot. Ital. xxi. 35-54).

An enumeration of the Lichens collected by Dr. Spegazzini during 1882 in the southern portions of South America. Twenty new species are described in the genera *Parmeliella*, *Lecanora*, *Pertusaria*, *Lecidea*, *Patellaria*, *Buellia*, *Byssocaulon*, *Leptotrema* *Arthronia*, *Agyrium* and *Arthopyrenia.* With reference to the paper it may not be considered as entirely out of place for us to remark that while we have in it a study of the Lichen flora of the Staten Island at the other end of the world, no work has ever been done on the Lichens of the Staten Island which lies at the mouth of the Hudson!

Michigan Forrestry Commission—First Report of the Directors. W. J. Beal and Chas. W. Garfield. (Pamph. O, pp. 92, Lansing, 1888).

Professor Beal contributes chapters of this report on "The succession of Forests in Michigan," "List of Trees and Shrubs belonging to Michigan," and others of practical importance.

Physiological Botany.—Principles of, as applied to Horticulture and Forrestry—IV. V. VI. VII. Geo. L. Goodale. (Garden and Forest, ii. 44, 45-66, 68, 69, 80, 81), *Phosphorescent Mushroom* (*Agaricus illudens*).—Geo. F. Atkinson. (Bot. Gaz. xiv. 19).

Pinus Sabiniana. (Gard. Chron. v. 45, fig. 6.

A representation of the tree in Kew Gardens.

Pollen of the Moon Flower (*Ipomœa Bona-nox*) *and of some of its Allies.* Alfred C. Stokes. (The Microscope, ix. 33-43, Plate 2).

Potamogeton perfoliatus, L., var. Richardsonii.—Arthur Bennett. (Journ. Bot. xxvii. 25).

Mr. Bennett notes that the name var. *lanceolatus*, Robbins, the common East American form of this species is antedated by var. *lanceolatus*, Blytt, a Scandinavian form, and proposes the above name for our plant.

Rosa humilis, var. *triloba.* S. Watson. (Garden and Forest, ii. 76, fig. 93).

A form of this variable species is figured and described, having three-lobed petals, and on this sport of a single specimen a variety is founded. Specimens of this and other species of *Rosa* are frequently found with the petals bi-lobed, and the tendency to double is common. Under the circumstances it hardly seems necessary or advisable to give varietal rank to what is evidently only an individual sport.

Thallophyte.—Notes on a New Ochraceous—Alexis A. Julien. (Journ. N. Y. Mic. Soc. v. 31-34).

A preliminary description of a supposed new genus, from Mommouth Co., N. J., and Sullivan Co., N. Y., apparently allied to *Leptothrix* or *Crenothrix.*

Vernonia in the United States—Distribution of. Joseph F. James. (Reprinted from the Journ. Cincinnati Soc. Nat. Hist. Jan. 1889).

The fifteen species and varieties credited to the United States are divided into two sections, under the author's arrangement,—those having linear and those having lanceolate leaves. The first of these is almost exclusively Western, and probably arrived by way of Mexico, spreading northward as far as Nebraska. The second group is claimed to have a general Eastern distribution, having probably come into its present habitat through the West Indies and Florida, extending northward through the Eastern States as far as Vermont. This theory of distribution seems to be strengthened by the fact that the species of each section are, in general, allied forms. The direction of the prevailing winds, at the season when the seeds are ripe, would also tend to assist in the distribution along the lines mentioned.

White Huckleberries.—W. G. Farlow. (Garden and Forest, ii. 50, 51).

As a contribution to recent notes on this subject the author mentions finding *Vaccinium Canadense* with flesh-colored fruit at Shelburne, N. H., and also calls attention to the fact that white fruited huckleberries have attracted some attention in Germany, where the loss of color has been shown to be due to the growth of certain species of fungi of the genus *Sclerotinia.*

Proceedings of the Club.

The regular monthly meeting was held Tuesday evening, February 12, 1889, the President in the Chair and 42 persons present.

Dr. Northrop showed specimens of *Symplocarpus fœtidus* in flower, and Mr. Ogden reported *Vinca minor* in bloom in West chester County, on January 13, evidences of the mild winter.

The paper of the evening was by Prof. Schrenk, on the "Floral Structure of *Chrysanthemum cinerariifolium*, and other species of Insect Flowers." He introduced his notes by remarks on the increasing importance of the study of Vegetable Histology, which in its practical bearings might be called "Applied Vegetable Anatomy." As the most important diagnostic character of *C. cinerariifolium*, overlooked by former observers, he mentioned and described the peculiar horizontal trichomes on the involucral scales. He spoke of sclerenchyma forming a large portion of the scales, the collenchyma in the stems and the stomata on the ligulate corollas. Some differences between these true "insect flowers" and adulterants were pointed out.

Mr. Sterns, Chairman of the Botanic Garden Committee, reported that the Commissioners of Public Parks had passed a resolution expressing their opinion that land should be set aside in one of the new parks for the purposes of a Botanic Garden if at any time within two years a sufficient sum could be raised as an endowment fund. One million dollars had been considered the minimum sum necessary for this purpose. The Committee had decided to attempt to raise this money by a popular subscription.

Dr. Britton exhibited a new species of *Senecio*, collected by Rev. Dr. Chas. H. Hall in the Yellowstone National Park, which he proposed to describe as *S. Hallii*.

A paper by Prof. L. H. Bailey on "Studies of Types of various Species of the Genus *Carex*," accepted for publication in the MEMOIRS, was read by title.

The adjourned meeting was held on Wednesday evening, February 27, the President in the Chair and 11 persons present.

Mr. Hollick read the announced paper of the evening on "Recent Additions to the Flora of Richmond County." This communication adds 36 to the published lists of Staten Island plants, which now include 1,287 species and varieties.

Mr. E. S. Miller exhibited several species of the smaller Cactaceæ of Texas and Mexico, a large number of which he is now successfully cultivating, together with a number of other greenhouse plants from Floral Park, New York. He also stated that he had been informed on good authority that *Magnolia glauca*, grew not many years ago in the swamps near New Utrecht Long Island, and suggested that members botanizing in that district the coming spring should look closely for it.

Dr. Britton showed specimens of *Pinus inops* sent from May's Landing, New Jersey, by Mr. J. C. Gifford and Dr. Peters, and also specimens from the same locality of what appears to be a two-leaved form of the Pitch Pine, *Pinus rigida*. He stated that Dr. Peters reports that this latter form is abundant in certain localities, and very distinct in general appearance from either *P. inops* or the common *P. rigida*. The cone is, however, quite that of certain forms of *P. rigida*. Further observations are necessary to determine the real status of the trees in question.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XVI.] New York, April 8, 1889. [No. 4.

Contributions to the Bryology of Canada.

BY JOHN MACOUN.

A catalogue of the whole flora of the Dominion of Canada, by the writer has, for five years, been in course of publication by the Geological and National History Survey, and has now extended to Part IV., which includes the Endogens. The next part of the Catalogue (Part V.) will include the ferns and their allies, mosses, liverworts, and the Characeæ. In connection with the preparation of this part of the catalogue, I enlisted the services of N. Conrad Kindberg, Ph.D., Linkoping, Sweden, who has examined the greater part of our mosses, and discovered a number of species new to science, and many others new to North America. At the same time I am issuing Centuries of Canadian mosses for the purpose of eliciting criticism, so that when the work is done it may be as near correct as possible.

The following descriptions of species are from the pen of Dr. Kindberg. The species were all detected by the writer, besides many others which will be published later.

DICRANELLA PARVULA, Kindberg, n. sp.

Allied to *D. varia*. Plants very short, densely cæspitose in small tufts, dark green. Leaves crenulate all around, sub-ovate; cells short, oblong-quadrate, the basal linear; costa very thick and brown, excurrent, denticulate above forming at least half of the acumen. Perichetial leaves denticulate above. Capsule obovate, sub-erect or inclined without a neck, not striate; beak very short and thick; annulus scarcely loosed; teeth orange, pale at apex, partite, without basilar membrane, not papilose; pedicel pale red-yellow; 1 cm. long or shorter, straight or curved only at apex. Diœcious.

On earth in the valley of Six Mile Creek, Selkirk Mountains, and at Kicking Horse Lake, Rocky Mountains. Collected July, 1885, by John Macoun.

DICRANUM SCOPARIUM, (L.), Hedw. var. SCOPARIFORME, Kindb, n. var.

Intermediate between *D. scoparium* and *D. fuscescens.* Diœcious. Leaves greenish-yellow, flexuous, lanceolate, subulate with a short and flat subula; margins nearly flat or slightly incurved, densely and sharply serrate to one-third; cell-walls not interrupted by pores; upper cells oblong-oval, lower not much narrower, inner basal light brown; costa thick, percurrent with two serrate ridges at the back in the upper part. Capsule curved, not striate; pedical red, short.

Described from specimens gathered at bottom of cañon below the bridge over Elk River, Rocky Mountains, by Dr. G. M. Dawson, 1883. Since found to be quite common in Canada east of the Great Lakes.

DICRANUM LEIONEURON, Kindberg, n. sp.

Stem tall, sparingly radiculose. Leaves pale-yellow, glossy, sub-erect subplane, ovate-lanceolate, narrowly short-subulate, subentire or with few teeth at apex; cells not porose, narrow except the basilar; alar cells brown; the median basal cells hyaline; costa smooth, very narrow. Barren.

In damp woods on McNab's Island near Halifax, Nova Scotia. June 19, 1883. John Macoun, collector.

DICRANUM STENODICTYON, Kindberg, n. sp.

Allied to *Dicranum scoparium.* Diœcious. Tufts very dense, blackish-brown, only the top leaves straw-yellow; 1–3 cm. high. Leaves flexuous, not undulate or crispate, short ovate-lanceolate, short-acuminate and blunt; margins flat above the middle, densely serrate above, more or less denticulate below; cell-walls not porose; upper cells oblong, lower sublinear; alar hyaline, faintly brown; costa narrow, not percurrent, simply dentate at back. Barren.

The color of the plant resembles *Hypnum sarmentosum.* In damp woods, Nova Scotia, Anticosti Island, and in the neighborhood of Ottawa, Ont. Collected first in June, 1883, by John Macoun.

BARBULA MEGALOCARPA, Kindberg, n. sp.

Differs from *B. ruralis* in the capsule being very much longer, and cylindrical, at least twice the length of the conic operculum, the peristome shorter than the tubulose base, the middle leaves more distant, the upper not emarginate or rounded at the apex, rather acute; the hair point is red at the base.

Not rare on rocks amongst other mosses in oak woods near Victoria, Vancouver Island. Collected in May 1875, and named *B. ruralis var. gigantea* by Austin. No mention of this form is made by Lesquereux and James. The specimens upon which the species is founded were collected April 21, 1887, by John Macoun.

GRIMMIA ARCUATIFOLIA, Kindberg.

Loosely tufted; tufts blackish, dark green above. Stems 5 cm. long, denudate at base. Lower leaves small, upper long and not crisped; hooked-recurved when moist, ovate-lanceolate, long-acuminate and acute, reflexed at least at one border with a short denticulate hair-point; the most basal cells pellucid, long and narrow, the upper basal cells sinuous, the marginal uniseriate and hyaline or not distinct; other cells chlorophyllous, quadrate and not sinuous; costa percurrent canaliculate, pellucid in the middle. Probably allied to the European *Grimmia elatior*, Bryol. Eu., but this species has also the upper cells sinuous.

Abundant on dry rocks at Cedar Hill, near Victoria, Vancouver Island. April 21, 1887. John Macoun.

RACOMITRIUM MACOUNII, Kindberg, n. sp.

Plants fastigiately branching; innovations without lateral fasciculate branchlets. Tufts loosely cæspitose, naked at base, brown, with green tips. Stems 5–7 cm. long, sparingly branching at the tips. Leaves loose, crispate when dry, patent or squarrose when moist, ovate-lanceolate, acute, muticous, smooth and entire; at one side slightly reflexed or erect, on the other always erect; upper cells quadrate and obscure, scarcely or not erose; lower linear and sinuose, marginal uniseriate, quadrate-rectangular and hyaline, basal yellow; costa brown and percurrent. Capsule oblong, dark brown, not striate; teeth orange, pertuse or cleft to below the middle, smooth; pedicel 0.5 cm. long, straight or suberect and contorquate.

In large masses, on huge boulders between Cathedral Mountains and Mount Stephens near Field, Rocky Mountains; also on rocks near the Glacier Hotel, Selkirk Mountains, B. C. Collected August, 1885, by John Macoun.

Scouleria aquatica, Hook. (*Grimmia Scouleri* C. Müll. Lesq. & James Manual.) This genus (*Scouleria*) is more nearly allied to *Cinclidotus* than to *Grimmia*. The plant occurs in two forms, possibly proper species, my specimens are not fruiting.

(*a*) *virescens*. Kindb.

Leaves dark green when dry, flaccid, oval-oblong, broader at the middle. On the rocks in Glacier Creek, above the railway bridge at the Glacier Hotel, Selkirk Mountains, B. C. 1885.

(β) *nigrescens*. Kindb.

Leaves blackish green when dry, rigid ovate-oblong, broader below the middle. On rocks in the bed of Nanaimo River, below the railway bridge, Vancouver Island. Collected 1887.

MERCEYA LATIFOLIA, Kindberg. n. sp.

Densely cæspitose. Plants 1–2 cm. high, brown ferruginous below, green at the tips, divided, at the base radiculose. Leaves quite smooth, spathulate-lingulate, obtusate or sub-acute; entire, slightly reflexed at base, plane above, broad-bordered with greater, orange-colored cells; basal cells narrow, upper small and round costa percurrent, or scarcely excurrent. Habit of *Barbulba ruralis.*

The systematic position of this genus is not quite definite. Prof. Boulay unites it to the Weissieæ; Schimper considered it allied to *Encalypta*; we suppose that it is more nearly related to *Barbula.* The allied European *Scopelophila ligulata*, Spruce, (*Merceya ligulata*, Sch.) differs in the leaves, smaller, narrow and rounded above, and the abbreviated costa; the capsule is gymnostomous.

Collected on the upper slopes of Mount Finlayson, near Goldstream, Vancouver Island, May 18th, 1887, by John Macoun.

PHYSCOMITRIUM MEGALOCARPUM, Kindberg, n. sp. (*Gymnostomum megalocarpum*, Kindb. Mss.)

Nearly allied to *Physcomitrium pyriforme* (*Gymnostomum pyriforme*, Lindb.); leaves longer, more or less acuminate, distinctly yellow-margined; cells smaller, the upper narrower; capsule larger, subglobose; lid conic, without distinct beak; calyptra unsymmetrical bilobed with long acumen; pedicel long.

Abundant in meadows in the neighborhood of Victoria, Vancouver Island. Collected May 7, 1875, and examined by Austin, who concluded it was a large variety of *P. pyriforme.* Lesquereux and James make no mention of it. Remarkably fine specimens were again collected May 8, 1887, by John Macoun.

BRYUM ANGUSTIRETE, Kindb.

Differs from *B. pendulum* in the leaves narrow, ovate-lanceolate, reflexed all around; upper areolation very narrow, sublinear, basal cells reddish; costa red. Capsule sub-cylindric; pedicel arcuate above; teeth paler; spores small, scarcely 0.02 mm. Synœcious.

On damp earth at the railway bridge over the Kananaskis, Rocky Mountains. Collected June 20, 1885, by John Macoun.

BRYUM VANCOUVERIENSE, Kindberg. n. sp.

Differs from *B. cæspiticium* in the leaves being longer acuminate, at base bright red, and reflexed only below the middle; cells small, upper very narrow, costa very thick, excurrent in most of the leaves; capsule not pendent and not constricted below the mouth; lid deplanate; spores larger, about 0.015 mm.; stem indistinct with gemmiform innovations; pedicel very long, 4-5 cm.

On wet slopes of Mount Finlayson at Goldstream, Vancouver Island. Collected June 28, 1887, by John Macoun.

BRYUM HYDROPHYLLUM, Kindberg. n. sp.

Closely allied to *B. pseudo-triquetrum*, but the leaves are narrower, ovate-lanceolate, reflexed at base or not at all; costa yellow; tufts loose, radiculose only below. Flowers and capsules not found.

Wet, springy places near the sea at Nanaimo, Vancouver Island. Collected June 4, 1887, by John Macoun.

BRYUM MEESIOIDES, Kindberg. n. sp.

Diœcious, densely cæspitose. Stem 1-2 c. m. high, reddish. Leaves yellowish, brown-margined, not decurrent, ovate oblong or short lanceolate, short acuminate, faintly denticulate at apex, slightly reflexed on the borders at the base, cells rhomboidal-oblong; costa red, scarcely excurrent, abbreviated in the lower leaves; male flowers discoid; perigonal leaves ovate-lanceolate, narrower areolate, denticulate from the middle; perichetial leaves narrow, more acuminate. Capsule narrowly pyriform, defluent to a longer collum, immature arcuate, pale, wide-mouthed, constricted below the mouth; lid convex, pale-yellow, mamillate, teeth pale yellow, connivent; annulus double; cilia perfect, long and appendiculate; basilar membrane very low or indistinct; pedicel 2-3 cm. long; spores very small, about 0.01 mm.

Differs from *B. turbinatum* in the leaves being narrower, brown margined and not decurrent; cells smaller; perigonial leaves denticulate; capsule arcuate and long-necked; spores smaller. Abundant in wet places at Nanaimo, Vancouver Island. Collected April 26, 1887, by John Macoun.

BRYUM (RHODOBRYUM) ONTARIENSE, Kindberg. n. sp.

Intermediate between *Bryum roseum* and *Bryum Beyrichii* (Hsch.) C. Muller. Comal leaves very numerous, lingulate, abruptly and short acuminate, revolute to ⅔ or ¾, yellow-margined above with great confluent teeth; costa stout, excurrent. Capsule pale, with a distinct, curved collum half as long; teeth papillose and hyaline above; archegonia numerous; lid convex, short apiculate, not oblique.

Hitherto confounded with *Bryum roseum* and quite common throughout Ontario; generally in a barren state. On old logs in all maple woods around Ontario.

POLYTRICHUM (POGONATUM) MACOUNII, Kindberg.

Diœcious; laxly cæspitose, green, brownish when old. Stem rooting only at base, ascending 8-15 cm. high, dichotomous branching. Leaves very long (1.5-2 cm.), when dry spreading or patulose flexuose and convolute, humid subplane linear-lanceolate, cuspidate from the short sheathing, dirty whitish base, densely and sharply serrate, spinulose and reddish at back towards the apex; lamellæ numerous (about 60), entire, each of round sexangular cells, costa long excurrent; lower cells of the leaf bare, elongate and narrow, the upper oblong, the cell walls often oblique and irregular. Perichetial leaves shorter and more acute than the other; seta robust, 3-6 cm. long pale, finally orange. Vaginule glabrate, pale; capsule 6 mm. long, obliquely inclined, cylindric-oblong without neck at the base, narrowed below the mouth, constricted, not angulose, finally dark brown, at first greenish with the mouth orange, 6-7 mm. long and 2 mm. broad; lid large conic-subulate, at base orange 2 cm. long; teeth of peristone 32 short.

This robust and very distinct species is allied to the Japonian *Polytrichum grandifolium* Lindb. Abundant on the borders of ravines on the upper slopes (4.500 feet) of Mount Arrowsmith, Vancouver Island. Collected July 13, 1887, by John Macoun·

Polytrichum sexangulare, Floerke.

Plants loosely cæspitose, not radiculose. Stems simple, erect, 1-2 cm. long. Leaves linear-lanceolate sub-obtuse, dry hooked-incurved; borders inflexed, entire or with 2-3 teeth at the apex; basal cells quadrate or short-rectangular. Capsule cubic-oval, 4-6-angular, inclined or erect; lid short-rostrate from a conic base, oblique; peristome subregular, hyaline; spores about 0.02mm.

Although Dr. Braithwaite (Brit. Mosses i., 51) describes the peristomial teeth as marked with an orange median line and the leaves quite entire, I have no doubt in identifying this plant with the European species. Schimper (in Synop. Musc. Europ.) describes the spores of all *Polytricha* as very small. "Sporæ minimæ, vix 1-100 mm. metientes," but the European form has not smaller spores than the form above described. Not before found in North America.

On the summit of Copper Mountain, Bow River Pass, Rocky Mountains, alt. 7,500 feet, Aug. 10, 1885. Collected by John Macoun.

DICHELYMA LONGINERVE, Kindb. n. sp.

Habit of *Hypnum fluitans.* Stems erect, about 1 decim. high, loosely cæspitose, rootless, subpinnately branching. Leaves falcate, entire, the upper yellowish-green, oval-lanceolate, entire, long acuminate, by the ¼-½ excurrent cota; most of the cells sublinear, the basal numerous, in 4-6 rows, subquadrate or rectangular, the alar greater, pellucid. Flowers and capsules unknown.

This species very much resembles a *Harpidium* and indeed may be one, as I thought at first sight. Quite common in dried-up ponds on sticks at Cedar Hill, near Victoria, Vancouver Island. Collected by John Macoun, June, 1887.

LESKEA NIGRESCENS, Kindberg.

Plants very small, densely tufted, blackish green, stems short, creeping, pinnate. Stem leaves close, appressed when dry, open-erect when moist, at base broadly ovate and scarcely reflexed, acuminate, entire, obscurely but faintly papillose, branchlet leaves erect, very much smaller and looser, blunt at the short acumen; cells round-oval, costa obsolete, rarely reaching to the middle. Diœcious. Fruiting specimens not found.

This species could possibly be referred to the genus *Heterocladium*, but the costa is not furcate. On flat boulders in McKay's Woods, Ottawa, Ont. Macoun, Oct. 12, 1885.

HYPNUN (CAMPTOTHECIUM) HAMATIDENS. Kindb.; (*Camptothecium Nuttallii*, Lesq. and James, l. c. in part.)

Diœcious. Densely cæspitose, yellow or green, glossy. Stems prostrate, scarcely or not radiculose, irregularly pinnate-ramose; branchlets short, attenuate and flexuose. Leaves open-erect, lanceolate, long filiform-acuminate, striate, hooked-denticulate or spinulose all around, reflexed on the borders; cells narrow, the basilar small and short; costa stout, vanishing at the apex. Perichetial leaves nerveless, narrowed into an erect or flexuous subulate point, entire or slightly denticulate. Capsule cylindric-oblong, curved suberect or inclined, without a neck; segments split their whole length or coherent at apex; cilia rudimentary; annulus narrow; lid conic obtuse, depressed in the middle and mamillate; pedicel 1-1.5 cm. long, rough the whole length.

Related to *H. Nuttallii, Wils*, but differs as above. On logs and trunks at Nanaimo, Vancouver Island. June 8, 1887. Collected by John Macoun.

A Descriptive List of Staten Island Diatoms.*

BY E. A. SCHULTZE.

Plate XC.

NAVICULA CARASSIUS, Ehr.

Navicula Carassius, Kütz. Bacill. p. 95. t. XXVIII. fig. 67; Rabenh. Süssw. Diat. p. 40, t. VI. 57; Ralfs in Prit. Inf. p. 900; Donkin Brit. Diats. p. 20, pl. III. fig. 7; O'Meara Rep. on Irish Diat. p. 412, pl. 34, fig. 20; Schum. Diat. der Hohen Tatra, p. 68.

Valve small, broadly lanceolate with produced capitate extremities; striæ moniliform, reaching to the median line, convergent opposite the central nodule and radiate towards the ends.

Hab.—Fresh water. Clifton. (Plate XC. fig. 13.)

A much smaller species than *N. pusilla* with much finer striæ, and at once distinguished by its narrow produced apices.—*Donkin.*

It is more than doubtful if the form described by Donkin as *Navicula Carassius* belongs to this species. The figure represents the form as very much longer, the ends finer and more produced, than is the case in *Navicula Carassius*; the striæ too, are described as granular, the striæ in *Navicula Carassius* are linear. Donkin regards the species as identical with *Navicula lacustris*, Gregory, A. J. M. S. 1856, p. 6, Pl. I. fig. 236, but the true *Navicula Carassius* is broadly elliptical, and not linear as the former is represented to be.—*O'Meara.*

There is a noteworthy difference of opinion between O'Meara and Donkin, as to the outline and striæ of *Navicula Carassius.* The Staten Island form closely resembles the figure drawn by West in Donkin; the form represented by O'Meara is almost too small for comparison.

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*Continued from Vol. XIV., p. 114.

NAVICULA PEREGRINA, Ehr.

Navicula peregrina. Van Heurck, Syn. Diat. Belg. pl. VII. fig. 2; Kütz. Bacill. p. 97, t. 28, fig. 52c; O'Meara, Rep. on the Irish Diat. p. 408, pl. 34, fig. 6; Ralfs in Prit. Infus. p. 906.

Pinnularia peregrina, W. Sm. Syn. Vol. I. p. 56, pl. XVIII. 170.

Valve linear lanceolate with acute non-constricted extremities; striæ radiate costate reaching to the median line.

Hab.—Marine, scarce. South Beach and Salt Meadows at New Dorp. (Plate XC. fig. 11.)

NAVICULA SMITHII, var. De Bréb.

Navicula Smithii, Van Heurck, Syn. Diat. Belg. pl. IX. fig. 12; Donkin, Brit. Diat. p. 6, pl. I. fig. 48; Brèb. in Sm. Syn. Vol. II. p. 92; Ralfs in Prit. Inf. p. 898; O'Meara, Rep. on the Irish Diat. p. 383, pl. 32, fig. 18.

Navicula elliptica, Sm. Syn. Vol. I, p. 48, pl. XVII. fig. 152; Kütz. Bacill. p. 98, t. 30, fig. 55.

Valve broadly elliptical with rounded apices; striæ distinct, moniliform, connivent, interrupted on each side of the median line by a longitudinal lunate line.

Hab.—Marine. South Beach. (Plate XC. fig. 17.)

Donkin gives as synonymous with the above the form of *Navicula didyma*, Sm. Syn. Vol. I. p. 53, pl. XVII. fig. 154 a. Wm. Smith remarks: "The insertion of this interesting form affords me an opportuuity of rectifying the synonymy of *N. elliptica* and *N. ovalis* of the synopsis, Vol. I. p. 48. Mr. De Brébisson informs me that *N. elliptica*, Kütz. Bacill. XXX, 55 is a fresh water form, first found by himself at Falaise; that it is identical with my *N. ovalis*, and therefore claims priority over this latter, which must in consequence be superseded. He suggests that the name *N. ovalis* should be cancelled, and that the name *N. Smithii* be given to the marine species, which I had designated *N. elliptica*; I gladly accept the compliment, and shall make the correction in a future revision of the text."

Kützing remarks in his work, published in 1844 as follows: Bailey, in the American Journal for January, 1842, gives us two figures on pl. II, (figs. 19 and 20), which closely resemble, but are much larger than our specimens. These forms of *N. elliptica* according to Bailey are from Virginia.

NAVICULA CRUCIFORMIS, Donk.

Navicula cruciformis, Donk. Quart. Micr. Jour. n. s. Vol. I. p. 10, pl. I, fig. 7.

Valve linear, slightly inflated in the middle, rounded extremities, striæ costate, oblique, reaching to the median line; blank stauros at the central nodule.

Hab.—Marine, scarce, Salt meadows at New Dorp. (Plate XC. fig. 1.)

Rabenhorst has referred this species to *N. Brébissonii* as a variety, forgetting that I described it as being a marine form; moreover, it differs essentially in the structure of the valve and in the contour of the frustule on the side view from *N. Brebissonii*, which in this aspect is linear, not constricted, and narrower.—*Donkin.*

NAVICULA MESOLEPTA, *var.* STAURONEIFORMIS, Ehr.

Navicula mesolepta, var. stauroneiformis, Van Heurck, p. 79, pl. VI. fig. 15.

Valve elongated linear; margins triundulating, forming three inflations, and terminating in rounded extremities; free median space with stauros at central nodule; costate striation.

Hab.—Fresh water, frequent, but not abundant. In ponds and wayside ditches in Clifton. (Plate XC. fig. 14.)

NAVICULA BICAPITATA, Lagerst.

Navicula bicapitata, Van Heurck Syn. Diat. Bel. pl. VI. fig. 14; O'Meara, Rep. on the Irish Diat. p. 352, pl. 30, fig. 32.

Valve linear, terminating in constricted broadly rounded apices; striation costate convergent at the centre and radiate towards the extremities; not reaching the median line; free space with dilation around central nodule. *Hab.*—Fresh water. Clifton. (Plate XC. fig. 3.)

Pinnularia biceps, Gregory, Q. J. M. S. 1856, p. 8, pl. I. fig. 28. Kützing has described a form under the name of *Navicula biceps*, Bacill. p. 96, t. 28, fig. 51, which is widely different from the present. Gregory's specific name must therefore be dropped.—*O'Meara.*

The figure in Kützing is certainly not that given by Gregory; but O'Meara should have added that the drawing of Gregory represents the true *Navicula bicapitata.*

NAVICULA FIRMA, Kütz.

Navicula firma, Kütz. Bacill. p. 92, t. XXI. fig. 10 : Ralfs in Prit. Infs. p. 909; Donkin, Brit. Diat. p. 31, pl. V. fig. 7; Sm. Syn. Vol. I. p. 48, pl. XVI. fig. 138; O'Meara, Rep. on the Irish Diat. p. 366, pl. 31, fig. 26.

Navicula amphigomphus, Kutz. Bacill. p. 93, t. XXVIII. figs. 40 and 41 ; Rabenh. Süssw. Diat. p. 38, t. VI. fig. 47; Ralfs in Prit. Inf. p. 908; Van Heurck, pl. XIII. fig. 2; O'Meara, Rep. in the Irish Diat. p. 367, pl. 31, fig. 27.

Navicula Iridis, Ehr.

Pinnularia amphigomphus, Ehr.

Valve large, linear lanceolate with obtuse extremities ; striæ punctuate, transverse, parallel, longitudinally crossed near the margin ; free space narrow and more or less inflated at central nodule. (Plate XC. fig. 15.) *Hab.*—Fresh water. Clifton, New Dorp.

In consequence of being subject to considerable variation in outline, the position of this species is in a state of great confusion. Kutzing's typical form was found in the well known fossil diatomaceous earth from Tanta Fiore in Italy ; as it occurs in this deposit its outline is almost linear, with cuneate, obtuse or sub-acute extremities. Ehrenberg, however, had elevated into a species that form of it in which the linear margins and cuneate extremities are most prominent, and into another species the other variety, in which the middle of the valve is more tumid, or elliptical ; the former he named *N. amphigomphus*, the latter *N. dilatata*. Between these two forms, however, every degree of gradation is observable ; consequently both are synonymous with Kützing's type.—*Donkin.*

NAVICULA TRINODIS, Sm., var. INFLATA, Schultze, n. var.

Navicula trinodis, Sm. Syn. Vol. ii. p. 94, Kütz. Bacill. p. 127 ; Ralfs in Prit. Inf. p. 894 ; Van Heurck, pl. XIV. figs. 31 a. 31 b.

Valve with two constrictions and three nearly equal inflations; extremities broadly rounded ; striæ linear-punctate, parallel, not reaching to the median line ; intermediate free space narrow excepting in the centre, where it is much expanded and shows a slight granular structure.

Hab.—Fresh water, Clifton, in pond near the old town road, scarce. (Plate XC. fig. 7.)

The description of *Navicula trinodis* in the authorities who mention this species is very incomplete ; thus both Wm. Smith and Ralfs record the striæ as obscure, and neither of them speaks of a free median space. This want of information on the subject led me to draw the Staten Island form at an amplification of 3000 diameters.

NAVICULA SEMEN, Ehr.

Navicula Semen, Kütz. Bacill. p. 99. t. XXVIII. fig. 49; Rabenh. Süssw. Diat. p. 38, t. V. fig. 2; Sm. Syn. Vol. I. p. 50. Pl. XVI. fig. 141; Ralfs. in Prit. Inf. p. 900; Donkin p. 21 pl. III. fig. 8; O'Meara, Rep. on the Irish Diat. p. 413, pl. XXXIV. fig. 22; Schumann, Diat. d. H. Tatra p. 68.

Valve linear elliptical; broad, with short slightly constricted rounded extremities; striæ reaching to the median line, costate, radiate towards the ends and convergent opposite the central nodule.

Hab.—Fresh water, Clifton, frequent, (Plate XC. fig. 2.)

NAVICULA BOREALIS, Ehr.

Navicula borealis, Kütz. Bacill. p. 96. t. XXVIII. fig. 68, 72; Van Heurck, Syn. p. 76, pl. VI. fig. 4; Ralfs in Prit. Inf. p. 907; O'Meara, Rep. on the Irish Diat. p. 345, pl. XXX. fig. 14.

Pinnularia borealis, Rab. Süssw. Diat. p. 42, t. VI. fig. 19; Sm. Syn. Vol. ii. p. 94.

Valve linear elliptical with rounded ends; costæ very stout and not reaching to the median line; intermediate free space broad, slightly inflated in the centre.

Hab.—Fresh water, Clifton. (Plate XC. fig. 16.)

The Staten Island form of *Navicula borealis* is an exceedingly large and beautiful one, being four inches in length when magnified 1000 dia. The drawings in Van Heurck, Kützing and O'Meara represent a much smaller diatom: the best of the three authorities is that of Van Heurck, the others are imperfect in detail.

NAVICULA LIBER, Sm.

Navicula Liber, Sm. Syn. Vol. I. p. 48. pl. XVI. fig. 133; Ralfs. in Prit. Inf. p. 907; Donkin, N. H. Br. Diat. p. 62, pl. IX. figs. 5 a, 5 b; Van Heurck, Syn. p. 104, pl. XII. fig. 36; O'Meara Rep. on the Irish Diat. p. 365, pl. XXXI. fig. 23.

Valve linear with rounded ends; striæ linear not reaching the median line, slightly radiate at apices; an intermediate free space.

Hab.—Marine. South beach salt meadows at New Dorp. Not frequent. (Plate XC. fig. 5.)

NAVICULA FORCIPATA, Grev.

Navicula forcipata, Ralfs. in Prit. Infus. p. 897; Van Heurck, p. 94, pl. X, fig. 6; O'Meara, p. 392; Donkin N. H. Brit. Diat. p. 12, pl. II, fig. 4.

Valve elliptical with rounded extremities; striæ linear punctate, reaching to the median line; slightly convergent at the ends, and intercepted by two longitudinal, free, lyrate spaces which converge at the apices.

Hab.—Marine. South beach. (Plate XC. fig. 4.)

NAVICULA MARINA, Ralfs.

Navicula marina, Ralfs in Prit. Inf. p. 903; Donkin, N. H. Br. Diat. p. 19 pl. III. fig. 5; Van Heurck, Syn. p. 98, pl. XI. fig. 16.

Navicula punctulata, Sm. Syn. Vol. I. p. 52, pl. XVI. fig. 151; O'Meara Rep. on the Irish Diat. p. 377, pl. 32, fig. 1.

Valve broadly elliptical with very slightly produced conic apices; striæ distinctly moniliform.

Hab.—Brackish water. South beach salt meadows at Garretsons. Rare. (Plate XC. fig. 8.)

Although this species is described as marine in the "Synopsis" of Prof. Smith, I have never found it in purely marine localities, where its congener *N. granulata* is found.—*Donkin.*

NAVICULA PERMAGNA, Bail.

Navicula permagna, Bail. Smiths. Contr. 1850, p. 4, pl. II. fig. 28; VanHeurck, Syn. p. 102, pl. XI. fig. I; Ralfs in Prit. Inf. p. 907.

Valve broadly lanceolate with obtuse apices, stout terminal nodules and broad median, longitudinal free space; striæ costate, radiant, interrupted near the margin of the valve by a depression.

Hab.—Brackish. Salt meadows at Garretsons. Scarce. (Plate XC. fig. 9.)

STAURONEIS PHŒNICENTERON, Ehr.

Stauroneis Phœnicenteron, Kütz. Bacill. p. 104, t. III. fig. 53; Sm. Syn. p. 59, pl. XIX. fig. 185; Van Heurck, p. 67, pl. IV. fig. 2; Brun. Diat. of the Alps and Jura, p. 88, pl. IX. fig. 7; Rab. Süssw. Diat. p. 47, t. IX. fig. 1; Ralfs. in Prit. Inf. p. 913.

Bacillaria Phœnicenteron, Nitsch, 1817.

Cymbella Phœnicenteron, Ag., Conspec. p. 10.

Navicula Phœnicenteron, Ehr.

Valve lanceolate with more or less produced obtuse extremities; stauroneiform, free space reaching to the margins; striæ punctate, convergent; the raphe forms two lines which often expand between the centre and the ends.

Hab.—Fresh water, Clifton, New Dorp, New Brighton, Garretsons. Very frequent but not abundant. (Plate XC. fig. 6.)

STAURONEIS GRACILIS, Ehr.

Stauroneis gracilis, Wm. Sm., Syn. B. D. p. 59, pl. XIX. fig. 186; Kütz. Bacill. p. 104, t. XXIX. fig. 3; Rabenh. Süssw. Diat. p. 48, t. IX. fig. 3; Ralfs. in Prit. Inf. p. 913; Brun, Diat. of the Alps and Jura, p. 89, pl. IX. fig. 6.

Valve lanceolate with obtuse apices; stauros linear, not reaching the margin; striæ delicate, punctate, convergent.

Hab.—Fresh water, scarce. Clifton, New Dorp. (Plate XC. fig. 10.)

Brun erroneously attributes *S. gracilis* to W. Sm.

STAURONEIS ANCEPS, Ehr.

Stauroneis anceps, Kütz, Bacill. p. 105, t. XXIX. fig. 4; Wm. Sm. Syn. Vol. I. p. 60, pl. XIX. fig. 190; Van Heurck, Syn. p. 68, pl. IV. figs. 4–5; Rabenh. Süssw. Diat. p. 48, pl. IX. fig. 14; Ralfs in Prit. Inf. p. 912; Brun, Diat. of the Alps and Jura, p. 89, pl. IX. figs. 1–2.

Valve lanceolate, constricted at extremities into rounded apices; stauros reaching the margin; striæ fine, convergent.

Hab.—Fresh water, not frequent. Clifton. (Plate XC. fig. 12.)

Some New North American Lichens.

By JOHN W. ECKFELDT, M.D.

During the year 1887 I had submitted to me for study a collection of Lichens made in Florida by Mr. W. W. Calkins, who was spending the winter at Jacksonville, and among the number of two hundred species there were several unknown at that time to me. With the kind assistance of Dr. Nylander, of Paris, who has named these plants, I am enabled to bring them before the attention of our Lichenists. One species herein enumerated is from the Pacific coast:

LECIDEA (BIATORA) FLORIDENSIS, Nyl. spec. nov.

Thallus cinerascens vel cinereo-fuscescens, tenuis, opacus, continuus; apothecia nigra, plana, marginata (latit 1 mm. vel minora), intus obscura; sporæ 8 nae. incolores, ellipsoideæ, simplices, longit 0,011-15, crassit 0,006-8 mm. paraphyses non bene distinctæ, epithecium et hypothecium fuscæ. Iodo getatina hymenialis fulvo rubescens (præcedente cærulescentia livi). Species videtur ex affinitata *L crustulatæ*, Ach., sed spermogonia non visa.

A rather rare and fine species, occurring in the neighborhood of Jacksonville, Fla., on *Carpinus Caroliniana.* Mr. Calkins informs me that he has found this plant but once, and I am of the opinion that it may occur more abundantly in more tropical regions. (Lichens of Florida, p. 6, No. 193, Eckfeldt and Calkins.)

STIGMATIDIUM INSCRIPTUM, Nyl. spec. nov.

Thallus albidus, tenuis, rugulosus, rimulosus; apothecia nigricantia gracilia elongata dendroideæ, divisa innata ; sporæ 8 næ. incolores, oblongæ, 3 septatæ, long. 0,011-14, crass. 0,004-5 mm. ; epithecium incolor, hypothecium fuscum. Iodo gelatina hymenialis cærulescens, dein fulvescens.

This remarkable species of *Stigmatidium*, which is most likely also of tropical origin, is, so far as we are aware, the only type of the genus ever occurring within the limits of the United States. The species, so far as known, are commonly found in Southern Europe and Equatorial America. The similarity of the species is also quite marked, and this plant is very closely allied to *S. venosa*, Sm. and *S. elegans*, Esch. Our plants occur commonly at Jacksonville on *Carpinus Caroliniana* and *Quercus virens* Lichens of Florida, p. 8, No. 244. Eckfeldt and Calkins, 1887.

ARTHONIA ALBO-VIRESCENS, Nyl. spec. nova.

Thallus albidus vel albido-virescens, tenuis, subleprous, effusus; apothecia nigra, punctiformia convexula (latit 0,1 mm. vel paullo majora, humida, fere latit 0,2 mm.), intus albida; sporæ 8 nae., incolores, ellipsoideæ, seriebus 6-10 loculoræ, subquaternis in quavis serie et vix discretis) long. 0,010-22, crass. 0,009-10 mm., epithecium fuscum. Iodo gelatina hymenialis fulvo-rubescens.

A much allied species to *A. abnormen* (Ach.), Nyl. N. Calid. p. 64. An abundant species at Fort George Island, Fla., on *Ilex Cassine*, but frequently in a sterile state. Lichens of Florida, p. 8, No. 250, Eckfeldt and Calkins.

GRAPHIS ABAPHOIDES, Nyl. spec. nova.

Thallus albus subfarinaceus inæqualis leprarioideus, tenuis, aut tenuior lævis ; apothecia incoloria oblonga aut linearia, margine thallino subprominuli cincta, epithecie rimiformi incolore; thecæ 1-4-sporæ, sporæ incolores oblongæ indistincte muralidivisæ, long. 0,075-0,130, crass. 0,015-32 mm. Iodo non tinctæ.

This plant has been distributed under the name of *G. Eustathiana*, which was nothing more than a herbarium name given to it by Prof. Tuckerman. The peculiarity of this plant is that it is of sub-tropical origin, and might be allied to *G. pumentaria*, or to *G. reniferme*, of Fee. Occurs at Jacksonville on *Persea.* Lich. Florida, p. 8, No. 231. Eckfeldt and Calkins.

GRAPHIS SUBVIRGNALIS, Nyl. spec. nova (e stirpe *G. pumentariæ*).

Sat similis *G. Virgineæ* et quoque thallo k e flavo ferruginee rufescente, sed sporæ oblongæ, 4-8næ indistincte (seriibus fere 14) murali-divisæ, long. 0,030-38, crass. 0,007-0,012 mm. Iodo non tinctæ.

Associated on the same substrata with *Arthonia alboviresceus,* but quite an infrequent species. Lich. Florida, p. 8, No. 233, under the name *G. subvirginea.* Eckfeldt and Calkins.

HEPPIA OMPHALIZA, Nyl. spec. nova (*Endocarpiscum.*)

Thallus castaneo-fuscus vel castaneo-nigricans, granulosus, granulis firlilibus squamulas sistentibus omphalariiforme rotundatas (latit.cerciter 1 mm.), convexulas, subtus pallescentes umbilicato-effixas; apothecia immersa endocarpodea pallida (latit circ. 01 mm) thecæ polysporæ sporæ oblongæ (long. 0,006-8, crass. 0,0035 mm.). Iodo thecæ cærulescentes, dein fulvescentes. Granula thalli minora spermogonia continent.

First collected in the summer of 1877 by Mr. Edward Palmer on granite rocks on the Islands of San Pedro Martin in the Gulf of California. Alt. 1,200 ft.

Contributions to American Bryology.—I.

BY ELIZABETH G. BRITTON.

AN ENUMERATION OF MOSSES COLLECTED BY MR. JOHN B. LEIBERG, IN KOOTENAI CO., IDAHO.*

(Plate XCI).

Sphagnum squarrosum, Pers. North Fork Basin, Lake Cœur d'Alene (84).

Sphagnum teres, Angstr. Lake Pend d'Oreille (45).

Mollia æruginosa (Smith), Lindb. (*Gymnostomum rupestre,* Schwægr). In spray of waterfall, Lake Pend d'Oreille (45).

Dichodontium pellucidum (L.), Schimp. North Fork Basin, Lake Cœur d'Alene (80).

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*Where no locality is given, the vicinity of Lake Pend d'Oreille is to be understood.

Anisothecium Grevillei (Br. & Sch.) Lindb. (*Dicranella Grevilleana*, Schimp). Springy places, Lake Pend d'Oreille, (44).

Dicranum scoparium (L.), Hedw. (42 and 47).

Dicranum fuscescens, Turn. Same locality (15).

Dicranum strictum, Schleich. On decaying logs, same locality (22).

Fissidens rufulus, Br. & Sch. (*F. ventricosus*, Lesq). Sterile on submerged rocks, same locality (61 in part).

Fissidens grandifrons, Brid. Granite ledges in swift mountain streams, sterile (63).

Fissidens bryoides, Hedw. North Fork Basin, Lake Cœur d'Alene (68 and 91).

Conomitrium Hallianum, Sull. & Lesq. On rocks at low-water line, Lake Pend d'Oreille, sterile (120).

Ceratodon purpureus (L.), Brid. (139).

Swartzia montana (Lamk.), Lindb. (*Distichium capillaceum*, Br. & Sch). North Fork Basin, Lake Cœur d'Alene (124).

Tortula pusilla (Hedw.) Mitt. (*Pottia cavifolia*, Ehrh.) Mixed with *Bryum argenteum*, var. *lanatum* (32).

Tortula princeps, De Not. (*Barbula Muelleri*, Br. & Sch.) (145).

Barbula unguiculata (Huds.) Hedw. One of the forms. (48).

Barbula subfallax, Muell. ? On decaying logs (52 and 96); around waterfalls (95).

Scouleria aquatica, Hook. (*Grimmia Scouleri*, Muell) With *Fissidens rufulus*, on submerged rocks sterile (61 in part).

Leersia extinctoria (L.), Leyss., var. *obtusifolia* (Funck), Braithw. (*Encalypta vulgaris*, Hedw. var. *obtusa*, Schimp.) Alpine regions, on the ground (33).

Leersia rhabdocarpa (Schwægr.), Lindb. (*Encàlypta rhabdocarpa*, Schwægr.) (153).

Leersia laciniata, Hedw. (*E. ciliata*, Hedw.) Mixed with small form of *Bartramia pomiformis* (153 in part).

Grimmia apocarpa (L.), Hedw. var. *gracilis* (Schleich.), Web. & Mohr (4).

Grimmia anodon, Br. & Sch. (31).

Grimmia torquata, Hornsch. (Plate XCI.) Fertile, on granite ledges about Lake Pend d'Oreille (20). Plants compared with Drummond's No. 58, Macoun's No. 91, and European specimens. Basal areolation of the leaves less quadrate and more sinuous than figured by Dr. Braithwaite (British Moss Flora, ii. t. xlvii. E), but a specimen collected by him agrees with American specimens (see figs. a, b, 4 and 5). Capsule exserted on a slender, curved pedicel, 3 to 5 mm. long, erect and twisted when dry, less than 1 mm. long, prolate-spheroidal when young, cylindrical and ridged when old and brown; operculum with a long, straight beak, just covered with the brownish, mitrate calyptra; annulus none, peristome also lacking on the only specimen which still retained the operculum; perichætial leaves three, longer and stouter than the stem-leaves, with a short hyaline, serrulate point, twisted around the base of the pedicel when dry, erect-patent when moist.

Closely resembling *G. trichophylla*, Grev., but capsule smaller on a pedicel longer in proportion to its size, more closely twisted when dry; teeth not present on any of the old capsules. Dr. Braithwaithe says, "short jointed filaments producing globose propagula at upper end, are frequent upon the leaves (l. c. 15, f. 10) these do not seem to be at all abundant upon American specimens, but appear rather as short, bifurcating, irregular filaments, than as moniliform hairs.

Grimmia pulvinata (L), Smith. Mixed with *G. trichophylla* (147 in part).

Grimmia pulvinata, var. *obtusa* (Brid.), Huebn. (3 in part).

Grimmia trichophylla, Grev. (3 in part, 147 in part).

Grimmia Donii, Smith. Spokane Falls, Washington (110).

Grimmia montana, Br. & Sch. Granite ledges (53).

Grimmia ovata, Web. & Mohr. (*G. commutata*, Huebn.), Lesq. & James, Manual, 145). (17).

Grimmia ovalis (Hedw.), Lindb. *G. ovata*, Lesq. & James, l. c. 143 not Web. & Mohr). (13).

Grimmia microcarpa (Gmel.), Lindb. *Rhacomitrium Sudeticum*, Br. & Sch. On gneissoid rocks, west of Lake Pend d'Oreille. (102 in part).

Grimmia heterosticha (Hedw.), C. Muell. (*R. heterostichum*, Brid.) (123).

Grimmia patens (Dicks.), Br. & Sch. (*R. patens*, Huebn., North Fork Basin, Lake Cœur d'Alene, mixed with 102). (127).

Grimmia acicularis (L.), C. Muell. *R. aciculare*, Brid.) In short, brownish-green, compact tufts, like Macoun's specimens from Yale, B. C. (19); also in loose, long, blackish-green bunches on gneissoid rocks, west of Lake Pend d'Oreille, mixed with *G. microcarpa.* (102 in part).

Coscinodon cribrosus (Hedw.), Spruce. (*C. pulvinatus*, Spreng.)? Teeth nearly entire on the only capsule found (35).

Weissia Americana, Lindb. (*Ulota Hutchinsiæ*, Schimp.) (11).

Orthotrichum Lævigatum, Zett.? (8).

Orthotrichum Texanum, Sull. Ledges, Lake Cœur d'Alene (133 in part); Lake Pend d'Oreille (60).

Orthotrichum rupestre, Schleich. Ledges, Lake Cœur d'Alene (134 in part); Lake Pend d'Oreille (37).

Orthotrichum affine, Schrad. On trees in woods (7, 11, 40 and 123 in part).

Orthotrichum alpestre, Hornsch. On trees (10).

Orthotrichum speciosum, Nees. On trees (152).

O. elegans, Schwægr., seems worthy of distinction, as Drummond's No. 155, and Mr. Leiberg's 9 and 152 in part are bright and green, with stems ferruginously tomentose, leaves more spreading, and other differences, for which see Venturi, Musc. Gall. 169, t. 46.

Orthotrichum fallax, Schimp. (159).

Orthotrichum obtusifolium, Schrad. On poplar trees, North Fork Basin (101). Specimens agree with Bryol. Europ. t. 208, and Lesq. and James Man. 177, but not with Venturi, Musc. Gall. 193, t. LII., but rather with *O. Rogeri*, Brid., Venturi, l. c. 186, t. 51.

Hedwigia ciliata, Ehrh. "Not common" (36).

Braunia Californica, Lesq. "Rather local" (103).

Anœctangium Lapponicum, Hedw. (*Amphoridium Lapponicum*, Schimp.) Precipices of the Chilco Range, south end of Lake Pend d'Orielle (89).

Anœctangium Mougeotii (Bruch.), Lindb. (*A. Mougeotii*, Schimp.) (76).

Ptychomitrium Gardneri, Lesq. (11 in part).

Funaria hygrometrica (L.), Sibth. North Fork Basin, Lake Cœur d'Alene (90); also a small set of plants too old for certain determination, alpine regions (34).

Bartramia pomiformis (L.), Hedw. var. *crispa*, Schimp. (112). Also dwarf form of the species, agreeing with Labrador specimens collected by O. D. Allen (53 in part).

Philonotis fontana (L.), Brid. (35).

Philonotis calcarea, Schimp. ?? "In a calcareous spring, very rare" (49). Capsules too old for certain determination; may be *P. fontana*, var.

Pohlia nutans (Schreb.), Lindb. (*Webera nutans*, Hedw.) (74 mixed with 140).

Pohlia cruda (L.), Lindb. (*W. cruda*, Schimp.) North Fork Basin (136).

Leptobryum pyriforme (L.), Wils, (150).

Bryum argenteum, L., var. *lanatum* Br. & Sch. Alpine regions (32 in part).

Bryum cæspiticium, L. Mixed with *Pohlia nutans* (140).

Astrophyllum medium (Br. & Sch), Lindb. (*Mnium medium*, Br. & Sch.) North Fork Basin. (92).

Astrophyllum cuspidatum (L.), Lindb. (*M. affine*, Bland). (93). Also from North Fork Basin (94).

ASTROPHYLLUM SPINULOSUM (Br. & Sch.) (*M. spinulosum*, Br. & Sch.) (2).

Leucolepis acanthoneura (Schwægr.), Lindb. (*Mnium Menziesii*, C. Muell). (98).

Mnium androgynum, L. (*Aulacomnion androgynum*, Schwægr.) (43 mixed with 96).

Timmia Austriaca, Hedw. On rocks and earth (99 and 113).

CATHARINEA SELWYNI (Aust.) (*Atrichum Selwyni*, Aust. Bot. Gazette, ii. 95.) (21).

Polytrichum alpinum, L. (*Pogonatum alpinum*, Roehl). (142).

Polytrichum piliferum, Schreb. (110).

Polytrichum juniperinum, Willd. (115).

Buxbaumia aphylla, L. Decaying logs, Traille River basin, (not numbered).

Fontinalis antipyretica, L. "In mountain streams, fruiting abundantly." (114).

Fontinalis Lescurii, Sulliv. Granite Ledges in Lake Pend d'Oreille (137).

Dichelyma uncinata, Mitt.? Decaying logs, bushes and twigs, North Fork Basin (81). Sent to Kew for comparison with the type; perichætial leaves are twisted!

Neckera Menziesii, Drummond. Granite ledges, fruiting abundantly with flagelliform branches (121). On trees and rocks at and below water-line, sterile (82).

Neckera Douglasii, Hook. On trees, sterile (83).

Antitrichia Californica, Sulliv. Granite ledges (18).

Climacium Americanum, Brid. Sterile (51).

Hypnum pseudo-sericeum, C. Muell. (29 in part).

Hypnum crispifolium, Hook. Along rivulets. (69); on the ground in woods (5).

Hypnum (*Camptothecium*) *lutescens*, Huds. (56 and 29 in part).

Hypnum æneum, Mitt. Typical (28).

Hypnum Nuttallii, Wils. (27 and 58).

Hypnum megaptilum, Sulliv. On the ground in damp woods, finer and more branching specimens than the type. (41).

Hypnum Stokesii, Turn. (65 and 69 in part).

HYPNUM (THAMNIUM) LEIBERGII, n. sp. North Fork Basin, Lake Cœur d'Alene, on quartzite ledges (78).

Diœcious; perichætial leaves ecostate with recurved apices, entire, or slightly serrulate; leaves costate to just below the apex, entire, or slightly serrulate below, coarsely serrate above; pedicel 1 cm. long, falling off with the capsules when old; inner peristome with three appendiculate regular cilia as long as the teeth, or occasionally irregularly united into one or two, and scarcely appendiculate.

Between *H. Alleghaniense*, Muell. and *H. neckeroides*, Hook, differing from the former in the diœcious inflorescence and from the latter in the length of the cilia. Mr. Wright has kindly compared specimens sent him with the type of *H. neckeroides* at Kew, and confirms the above diagnosis.

Hypnum loreum, L. (84). Lake Cœur d'Alene.

Hypnum triquetrum, L. (97).

Hypnum splendens, Hedw. (100).

Hypnum uncinatum, Hedw. var. *plumosum*, Schimp. (131).

Hypnum robustum, Hook. Cañons and valleys in the Traille River Basin (not numbered).

Hypnum subimponens, Lesq. (129).
Hypnum aduncum, Hedw. var. *giganteum*, Br. & Sch. (88).

Description of Plate XCI.

Figs. 1-5, drawn from J. B. Leiberg's specimens.
Figs. a and b, drawn from Dr. Braithwaite's specimen.
Figs. a and 4, hyaline toothed apices of the leaves.
Figs. b and 5, elongated basal cells.
Fig. 3, Old, ridged capsule.

Botanical Notes.

The *Botanical Society of Western Pennsylvania* is the name of an organization established last October at Pittsburgh, "to bring into communication those who are interested in Botany, to advance their knowledge of the subject, and to create a more wide-spread interest in the study of plants," in which praiseworthy objects the editors of the BULLETIN wish the officers of the new society the greatest success. Meetings are held monthly, the fourth Thursday in every month, at the Pittsburgh Library. From the calendar of the society recently received we learn that the officers for 1888-'89, are as follows: President, Dr. Wm. R. Hamilton; Vice-president, Dr. A. Ziegler; Corresponding Secretary, Mr. J. D. Shafer; Recording Secretary, Miss Willa Z. Matthews; Treasurer, Mr. C. C. Mellor. Over 50 members are now enrolled.

Heterogamy in Alnus serrulata. Passing along a road fringed with *Alnus serrulata* near Yonkers, New York, the other day, I was interested to note that one clump had no staminate catkins, and that the pistillate ones were much more numerous than in the normal monœcious type. A day or so later, other plants showing the same peculiarity were observed in another locality. These were marked so that they might be watched next season. This entire absence of staminate catkins seems to show a tendency on the part of *Alnus* to become diœcious. I could, however, find no plants producing only male catkins, and am interested to know whether any such have been observed by others, and whether the peculiarity noted by me has been common elsewhere this spring. ALICE B. RICH.

[Androgynous catkins are recorded for this species from

Providence, R. I., by Professor W. W. Bailey, (BULLETIN, vi. 312), and for *A. fruticosa* by C. A. Meyer (*fide* Masters, Veg. Teretology, 192), but the complete change from the monœcious to the diœcious condition in the genus does not appear to have been mentioned, and is of but infrequent occurrence, though known in *Juglans* and *Morus.*—ED.]

Reviews of Foreign Literature.

The Orchids of the Cape Peninsula. By Harry Bolus, F.L.S. (Trans. South African Philos. Soc. v. part 1, pp. 200, with 36 plates, partly colored, Cape Town, 1888.) The South African Flora must afford a rich field of study for those interested in orchids, and who is not? for out of some 1,750 flowering plants, 102, or 5.8 per cent. are of this order.

This is indeed a remakable proportion, and as shown by Mr. Bolus in his interesting preface, is probably not surpassed by any region of equal area (197 square miles) in the same latitude. They are included in but ten genera, however. Of the five tribes of the order the Neottieæ and Cypripedieæ are not represented. The monograph is very complete, and is ornamented by extremely good plates executed after drawings by the author, mainly from living plants. N. L. B.

Studies on the Tilopterideæ. In the recent numbers of the Bot. Zeitung (Numbers 7, 8, 9, of 1889), Prof. J. Reinke describes several genera of the Tilopterideæ. This family includes a small number of small marine-algæ and is of interest chiefly owing to the question of its supposed place in the system. After the usual exhaustive historical sketch and another concerning its geographical distribution, he gives a description of three species representing as many genera.

The first, *Haplospora globosa*, Kjellm, is a small alga growing in tufts of from 2-10 centimetres in height, these being fastened on small stones or shells, rarely on larger algæ. These tufts of brownish-yellow color consist of numerous single plants resembling *Sphacelaria* in general form and *Ectocarpus* in their manner of branching. The part of the plant growing up from the rhizoid-like cells which serve to fasten it to the stone or shell, he calls a thallus; it consists of several rows of cells originating from a single row of long cylindrical cells, and terminating also in a single row, the upper one of which is not an apical cell, as in case of *Sphacelaria*, but grows out to a long hair-like appendage; subsequent growth in length takes place by intercolary cross division of single cells. The manner of branching is fully described, but the chief interest from a systematic standpoint lies in the manner of reproduction, which in this genus appears to be non-sexual. The organs of reproduction are termed sporangia and occur either as end cells of side branches, which take the place of the hair-like projections, or in certain cases the sporangium branch is reduced to a single cell, and even in some instances the reduction goes so far that a vegetative cell of the main branch becomes a sporangium. In the early stage of this cell it is filled with a homogeneous, granular substance which fills the space between the nucleus and the chromatophores pressed against the wall. In the next stage are found numerous small bodies which he names mucilage bodies, and others resembling those in the brown algæ; these are separated more or less regularly by fine walls of granular protoplasm.

The nucleus now divides, the two nuclei again divide, they separate from each other, and at this stage a thin membrane is formed around the contents of the sporangium, lying close to the wall of the latter. This wall now breaks and the spore escapes with its new membrane and its four nuclei. It begins to germinate at once, the single cell dividing into four, and by subsequent divisions a small tuber-like body is formed from which arises the stem or thallus of a new plant. Some variations from this process are recorded, but this he claims to be the normal method. Concluding the description of this plant, the author says that he has examined hundreds of this species and does not hesitate to affirm that its method of reproduction is wholly non-sexual. If an analogy between this and the brown algæ is sought for, it may be found in the similarity of vegetative structure which exists between this and the genera *Sphacelaria* and *Ectocarpus*. In the method of reproduction, however, it is most like the tetraspore-producing Dyctyoceæ. In both the spores are sexually produced; in both kinds of spores are four nuclei which result in dividing the spore into four cells. Here the similarity ceases. The difference in the vegetative form, however, is too great to admit of its being closely related to the last named group.

Another genus, *Scaphospora speciosa*, Kjellm., is described, resembling *Haplospora* in external appearance, but is not so easy to cultivate and is found in much smaller quantities; it differs from it by having two kinds of reproductive organs, which are called oosporangia and zoosporangia. The former are very similar to the intercalated sporangia of *Haplospora*; the contents at first resemble those of the other vegetative cells, various changes take place somewhat similar to those described in *Haplospora*; the nucleus, however, does not divide, neither is there a new wall formed around the contents before they escape from the sporangium case. The wall of this case dissolves at a convenient place, the contents escape, assuming at once a spherical shape. Although the author was unable to trace the very next steps in the development of this sphere, owing to the scarcity of material and the difficulty of its cultivation, he says these two points of difference between it and the spore of *Haplospora*, viz: there being only one nucleus and its lacking a membrane, are sufficient to warrant its being considered an egg. The next stage observed was that in which this egg was invested with a membrane and had divided into four cells, each containing a nucleus. Some were found, having sent out rhizoid-like protuberances.

The second kind of reproductive organ occurs on the same individual. It consists either of a metamorphosed branch or parts of branches easily distinguished by the large number of little cells of which they consist.

The direct escape of the contents of these zoosporangia was not observed, but a large number of empty cases were found, also some whose contents had only partially escaped. In these the remaning spores appeared to be naked spheres with two small chromatophores. No cilia could be distinguished. Now in the fresh material containing the empty sporangium cases were found numberless little swarm spores in active motion, whose size and appearance corresponded to the spores found inside the sporangia. These swarm spores, were long, egg shaped, with two cilia, and the view that they were the developed spores of the zoosporangia was strengthened by the fact, that in the vicinity where these plants grew, were found only four other kinds of plants, and the swarm spores of all these plants are known to be different from those found among the *Scaphospora* plants. These facts are supposed to furnish pretty strong evidence that the organ described as oosporangium is a real oogonium and that the zoosporangium correspond to antheridia and produce the spermatozoids whose function is the fertilization of the egg.

The third genus, *Tilopteris*, is only lightly dwelt upon in this article; its manner of reproduction is said to resemble that of *Haplospora.* The author expresses a wish that some botanist who is able to procure a larger number of plants of the genus *Scaphaspora*, and who has a more favorable chance to watch their development, may be able to fill up the gaps in the investigations just recorded, and in concluding speaks against the separation into so many genera, saying there seems no good reason why *Haplospora* and *Scaphospora* may not be united as one genus with *Tilopteris.* E. L. G.

Index to Recent American Botanical Literature.

Abies bracteata. (Gard. Chron. v. 242, Fig. 44,)

Abies lasiocarpa. M. T. M. (Gard. Chron. v. 172, 173; illustrated.) An interesting discussion of the species and the confusion in regard to its synonomy.

Agaricus Rodmani—Note on the Poisonous Properties of the. John Macoun. (Ottawa Naturalist, ii. 142, 143).

Algæ from Granville, O.—List of. Chas. L. Payne. (Bull. Denison Univ. iv. 132.) A possible new species is described: *Spirogyra Herricki.*

Algo-Lichen Hypothesis—The Status of the. Thos. A. Williams. (Am. Nat. xxiii. 1-8.) An interesting resumé of the conflicting opinions concerning the systematic position of these plants.

Aristolochia Sipho. Mrs. Hoskins. (Vick's Monthly, xii. 72, illustrated.)

Asa Gray—Memorial of. (Trans. Mass. Hort. Soc. for the Year 1888, pp. 155, 156.)

Asa Gray. W. G. Farlow. (Ber. der Deutsch. Bot. Gesellsch. vi. 31–38.)

Biologia Centrali-Americana or Contributions to the Knowledge of the Fauna and Flora of Mexico and Central America—Botany. W. B. Hemsley. 4to. Four volumes. London, 1879–1888.)

This great work, which has occupied so much of Mr. Hemsley's time during the past ten years, is now completed by the issuing of a supplementary part containing the Introduction and a Commentary thereon by Sir Joseph Hooker, to be bound with Vol. i., and the Appendix of 225 pages, to go at the end of Vol. iv. The Introduction considers the problems of geographical distribution involved and the relation of the flora of the Central American region to other parts of the globe. The Appendix treats of the History of Botanical Exploration of the region, giving brief biographical sketches of all the collectors, a summary and analysis of the Flora, and other matters of general interest.

Botanical Notes. Geo. Vasey. (Bull. No. 8, Bot. Div. U. S. Dept. Agric. 18, 19.) A series of brief memoranda, mostly in regard to grasses.

Botanische Garten. (Pharm. Rundsch., vii. 51–54.) An account of the proposed botanic garden for New York City, with comments upon the subject.

Canadian Plants—Check List of. James M. Macoun. (Pamph. 8vo, pp. 68, Ottawa, 1889.)

Cape Cod Plants.—A Few. Walter Deane. (Bot. Gaz. xiv. 45–47.) The author notes that it was in a pond not far from his abode that the pink variety of *Castalia odorata* "originated," and adds the pleasing news that the water was dotted with the flowers (August, 1888), and that "the pond is jealously protected from invaders." This variety is occasional in southeastern New Jersey.

Clavarina fragrans, Ell. and Ev. and *Clavarina velutina*, Ell. and Ev. (Grevillea, xvii., 59.) These recently described species are referred to *Lachnocladium Micheneri*, B. & C., and *L. semi-vestitum*, B. & C., respectively.

Cultivation of Mushroons in Abandoned Mines at Akron, N. Y. Wm. T. Warren. (Trans. Amer. Inst. Mining Engineers, Buffalo Meeting, October, 1888.)

Cuscuta Gronovii—On. Henrietta E. Hooker. (Bot. Gaz. xiv. 31–37, Pl. 8.)

Desmids from Massachusetts—List of. Wm. West. (Journ. Royal Micros. Soc. 1889, 16–21. Two plates with 24 figures.)

An enumeration of species found in gatherings made by Mr. John M. Tyler, of Amherst, including 89 forms. *Closterium subdirectum* and *Xanthidium Tylerianum* are new species, and several new varieties are named. *Cosmarium Cordanum*, Breb. is reported for the first time from the United States, and there are other interesting features of the paper. The plates are beautifully drawn and executed.

Desmids—Their Life History and Classification. F. B. Carter. (Amer. Month. Micros. Journ. x. 35–38.)

Dionæa—Electromotive Properties of the Leaf of. B. Sanderson. (Proc. Royal Soc. xliv. 202–204.)

Fendlera rupicola. (Garden and Forest, ii. 112, Fig. 98.)

Flora Brasiliensis—Melastomaceæ. A. Cogniaux. (Mart. Flor. Bras. xiv. part iv. Folio pp. 656, 130 plates, Leipsic, 1886–1888.)

Another part of the great Brazil Flora is completed by the appearance of fascicle 103, continuing and finishing the Melastomaceæ, the first two tribes of the order having been given in Part 3 of the same volume, finished in 1885.

Flora Ottawaensis. J. Fletcher. (Pages 42–45 are bound in with vol. ii. Nos. 10 and 11 of the Ottawa Naturalist.)

This installment begins with *Aster junceus*, Ait., and terminates with *Senecio vulgaris*, L.

Forests and Woodlands of New Jersey, IV. J. B. Harrison. (Garden and Forest, ii. 117, 118.)

An interesting account of the large oaks at Salem and May's Landing and other remarkable trees in Atlantic and Cape May Counties. The article also includes a vigorous protest against the barbarons practice, so often permitted, of sacrificing noble trees in many of our villages in order to obtain perfectly graded streets and mathematically straight sidewalks. It is pleasing to note, in antithesis to this, that in the village of May's Landing street lines have been deflected in order to preserve trees, and the inhabitants find it no hardship to turn a little out of their course in walking along the sidewalks where it has been deemed advisable that trees should be permitted to remain in the middle of the same.

Forest Trees and Shrubs to be Found in Meriden, Conn.—A List of the. Chas. H. S. Davis. (Trans. Meriden Sci. Assoc. iii. 46-78.) The terms family, species and variety are somewhat mixed in this paper; thus, under the caption *Arctostaphylos Uva Ursi* we are told that "there are many other *varieties* in Meriden belonging to this *family* [Ericaceæ?] which have been identified. *Andromeda polifolia*, &c., &c." Why these are not included in the list does not appear. The attempt has been made to make it acceptable to the average reader, rather than a perfect scientific catalogue.

Fritillaria Kamtschatensis. (Garden, xxxv. 143, illustrated.)

Fungi—North American. A. P. Morgan. (Journ. Cincinnati Soc. Nat. Hist. xi. 141–149, Pl. III.; also reprinted.) This is the first installment of a series of papers upon the subject, and treats of the genera included under the order Phalloideæ. A new species is described and figured, *Mutinus Bovinus*, found growing in rich soil in cultivated grounds and woods in Ohio.

Grasses—Notes on. Geo. Vasey. (Bull. No. 8, U. S. Dept. Agric. 16, 17.)

Grindelia robusta—Ueber den Anatomischen Bau von. Joseph Beauvais. (Ber. der Deut. Bot. Gesellsch. vi. 403, 404.)

Guatemala—Undescribed Plants from. VI. John Donnell Smith. (Bot. Gaz. xiv. 25–30, plates VI. VII.) *Guatteria grandiflora ; Ceidemia cymifera ; Blakea Guatemalensis* (Pl. vi.) ; *Clibadium arboreum ; Neurolena lobata,* R. Br. var. *indivisa ; Ardisia micrantha ; Tournefortia bicolor,* Swz., var. *calycosa : Ipomœa discoidesperma ; Solanum sideroxyloides,* Schl., var. *ocellatum ; Solanum olivæforme ; Tetranema evoluta ; Scutellaria orichalcea ; Daphnopsis radiata ; Hypoxis radiata* are the newly described species and varieties. *Louteridium Donnell-Smithii,* Watson, is figured on Pl. VII., and an error in the original description rectified.

Helianthus and Allied Plants. Geo. D. Phippen. (Bull. Essex Inst. xx. 38–40.)

Hepaticæ, Westindische. F. Stephani. (Hedwigia. xxvii. 276-302. tt. xi.-xiv.) The first part enumerates 111 species from Porto Rico, collected by H. Sintensis and Prof. Urban, including descriptions of ten new species, and in part second are listed those collected by Baron Eggers in St. Domingo and Dominica, comprising 36 species, of which two are new, and both figured. E. G. B.

Lycoperdon Missouriense. (Grevillea, xvii. 56.) This species, lately described by Prof. Trelease in Trans. St. Louis Acad. Sci., December, 1887, is stated to be undoubtedly the same as *L. lilacinum,* B. and M.

Maize. F. Leroy Sargent. (Pop· Sci. News. xxiii. 7, 22–24; illustrated.)

Mosses—Notes on North American. I. C. R. Barnes. (Bot. Gaz. xiv. 44, 45.)

Bryum Knowltoni, a new species, is described, found in rock crevices, Funk Island, Newfoundland, by F. H. Knowlton.

Nomenclature—The Questions of. C. E. Bessey. (Am. Nat. xxiii. 53.)

Notes on Pondweeds—Potamogeton varians, Morong. Alfred Tryer. (Journ. Bot. xxvii. 33–36.)

Mr. Fryer takes up Dr. Morong's manuscript name for the plant described by Robbins in Gray's Manual as *P. gramineus*, L., var. (?) *spathulæformis*, from Mystic Pond, Mass. He finds the same form in Cambridgeshire, where it fruits freely, which it has not been observed to do in America.

Opuntia Rafinesquii. J. D. Hooker. (Bot. Mag. Tab. 7041.)

Panicum in the United States--The Genus. Geo. Vasey. (Bull. No. 8, Bot. Div. U. S. Dept. Agric. 20-39).

A proposed systematic arrangement of the sixty-four species credited to the United States, with descriptions. Section vii, (*Eupanicum*), containing the species *dichotomum* and *scoparium*, is somewhat amplified by the restoration of the old species *nitidum* and *laxiflorum.* The former is also represented by three varieties; *minor*, *ensifolium* and *major*, and the latter by one, *pubescens.* The species *dichotomum* is enlarged by the addition of vars. *barbulatum*, *viride*, *divaricatum*, *villosum* and *elatum.* We do not believe that the treatment of this section will generally be taken as final. *P. Wilcoxianum* from Nebraska, *P. Chapmani*, (*P. tenuiculmum*, Chapm.), from Florida, *P. Reverchoni*, *P. pedicellatum* and *P. Havardii*, from Texas, are new species. The paper is hardly to be considered a monograph—we wish it might be; it is more properly a descriptive list.

Penicillium glaucum—Examination of.—H. L. Osborn. (Amer. Month. Micros. Journ. x. 1-4).

Physalospora Bidwellii—Formation des asques dans le. Frechon, (Comptes Rendus, CVI., 1,361).

Physiological Botany—Principles of, as applied to Horticulture and Forestry, viii. ix. x. xi. Geo. L. Goodale. (Garden and Forest, ii. 92, 104, 105, 116, 117, 128, 129).

Picea lasiocarpa, (Garden, xxxv. 201, illustrated).

Populus monilifera. (Garden, xxxv. 189, illustrated).

An account of a specimen in Danny Park, Sussex, England. It is evidently a very old tree and presents a most extraordinary appearance, many of the branches resting on the ground where, we are told, they have taken root and sent up new vertical shoots. The tree is supposed to be more than one hundred years old.

Rusting of Wheat, (*Puccinia graminis*). Otto Luggar. (Bull. 5, College Agric. Univ. Minn., 53-67; illustrated).

Strawberry—Notes on the History of the.—E. Lewis Sturtevant. (Trans. Mass. Hort. Soc. for the year 1888, pp. 191-204).

An exhaustive treatise, containing a bibliography of more than sixty citations, besides notes on distribution, synonomy and varieties. An appendix gives a list of fifty-four representations of the strawberry published previous to the present century, and dating as far back as 1484.

Tephrosia heterantha—Cleistogamous Flowers of.—G. Hieronymus (Jahrb. Schles. Gesell. Vaterl. Cultur. 1887, 235; Journ. Roy. Micros. Soc. 1889, 85).

Umbelliferæ—Revision of North American.—John M. Coulter and J. N. Rose. (Pamphlet, 8vo. pp. 144, nine plates, Crawfordsville, December, 1888).

This excellent monograph of the North American representatives of a most difficult order of plants supplies a want long felt in American science, and the authors should have the thanks of the whole botanical fraternity for their patient and thorough work. We have carefully examined every page of it, and while there is room for considerable difference of opinion concerning the disposition of certain forms and groups, we have little but praise for the general treatment of the subject. The collections in nearly all the larger herbaria were examined. The Systematic Synopsis is prefaced by a few pages of general introduction, in which the morphology of the plants is described and the characters most depended on in the classification are discussed, the fruit being emphasized as by far the most important of these. There is also an artificial key to the genera; want of space forbids a complete presentation of all the changes made in nomenclature, and an enumeration of the very considerable number of new species proposed. *Coloptera*, founded on *Peucedanum Newberryi*, and two new species; *Pseudocymopterus*, founded on *Cymopterus montanus*, *C. bipinnatus* and *C. anisatus*; *Museniopsis*, consisting of *Tauschia Texana*, Gray; *Harbouria*, based on *Thaspium trachypleurum*, Gray; and *Aletes* (*Deweya acaulis*, Torr.), are all new genera. *Oreoxis humilis*, Raf., having priority, replaces *Cymopterus alpi-*

nus, Gray. Indeed there is evidence throughout of a strong tendency towards maintaining the original names, which we are very glad to see, and can only wish that it had been carried somewhat further, and a fixed point been reached for a few names which must yet be modified. The only reprehensible thing of note in the work is the citation of Bentham and Hooker as authority for six names and several additional synonyms which they never established. This is not an original sin with Messrs. Coulter and Rose, but it is none the less misleading, and inasmuch as it is not the practice even at Kew, where the Genera Plantarum was written, and we have it from the surviving author that it was never intended, there seems small ground for its continuance. N. L. B.

Wild Berries and Other Edible Fruits of Newfoundland and Labrador—A Summary Account of the.—Rev. Arthur C. Waghorne. (Pamph., pp 11, St. John's, New Foundland, 1888].

Proceedings of the Club.

The regular meeting was held Tuesday evening, March 12th, the President in the chair and thirty-six persons present.

Dr. O. R. Willis read the announced paper "On the Pronunciation of Botanical Names." He spoke of the great importance of a standard in pronunciation for the two thousand words used in botany exclusive of the names of plants, and suggested that such a standard should be established.

Dr. Britton exhibited a collection of plants made in Iceland by Professor and Mrs. C. Sprague Smith, among them *Hieracium aurantiacum*, not reported in lists of the Iceland flora and very likely of recent introduction from Scandinavia.

Mr. J. W. Martens, Jr., showed specimens of the following plants found in the vicinity of Lake Mohegan, Westchester County, New York, and new to the flora of that county: *Viola palmata*, L.; *Nemopanthes Canadensis* (Michx.), D. C.; *Rubus triflorus*, Richards.; *Aster cordifolius*, L., var. *lævigatus*, Porter; *Senecio aureus*, L., var. *obovatus* (Muhl.), T. and G.; *Lactuca Floridana* (L.), Gærtn.; *Limnanthemum lacunosum* (Vent.), Griseb.; *Mentha sativa*, L.; *Amaranthus chlorostachys*, Willd.; *Quercus ilici-*

folia, Wang.; *Habenaria blephariglottis* (Willd.), Torr.; *Xyris Caroliniana*, Walt.; *Potamogeton gramineus*, L.; *P. pauciflorus*, Pursh; *Eriophorum gracile*, Koch, and *Aspidium Boottii*, Tuckerm., the last named new to the local flora.

The adjourned meeting was held Wednesday evening, March 27, the Vice-President in the chair and twenty-two persons present.

Mr. Herman J. Muller was elected an Active Member and the following were elected Corresponding Members: Dr. J. Schneck, Prof. Isaac Sprague, Prof. J. Giovanni Briosi and Miss Effie Southworth.

The committee on Cryptogamic Botany presented notes and specimens illustrating recent Bryological studies. The anatomy of a moss was illustrated and described by Mr. Jelliffe; Miss Steele showed a large number of specimens illustrating the local moss flora, and Mrs. Britton showed some of the rare mosses collected in Idaho by Mr. J. B. Leiberg, *Hypnum megaptilum*, *Anisothecium Grevillei*, *Catharinea Selwyni*, *Hypnum* (*Thamnium*) *Leibergii*, n. sp. and *Grimmia torquata* in fruit!

Miss Cannon exhibited flowering specimens of *Dicentra Cucullaria* collected March 27th at High Bridge, New York, and other indications of the forward state of vegetation were given by several members.

Miss Rich exhibited branches of the common Alder, *Alnus serrulata* in pistillate flower only, from Yonkers, New York, and stated that many bushes bearing only pistillate catkins had been observed in that vicinity this spring, indicating a tendency towards diœcism in the species.

112

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XVI.] New York, May 8, 1889. [No. 5.

Preliminary Note on the North American Species of the Genus Tissa, Adans.

By N. L. Britton.

Botanists have had great difficulty in limiting the species of Sand Spurrey. There is, indeed, perhaps no other genus of flowering plants concerning whose specific composition more widely diverse views have been propounded. Thus we find Mr. Bentham in 1862 (Genera Plantarum, i. 152) regarding the species as "3 vel 4," while N. C. Kindberg's elaborate Monograph of the following year (Nova Acta Reg. Soc. Sci. Upsal. (III.) vii. fasc. i.) contains descriptions and figures of not less than 25. Durand's recent "Index Generum Phanerogamorum" repeats the Benthamian view, which Baillon also apparently defends (Histoire des Plantes, ix. 116) saying "species ad 3." This last is the latest expression we have had on the subject, published indeed, during the past year, and we may now look with much interest for the dictum of the distinguished authors of "Die Naturliche Pflanzenfamilien" which has not as yet treated of the Carophylleæ.

So far as North American botanists have been concerned with their native plants, there has not been much difference of opinion expressed—however much may have otherwise existed—for the species have never yet been systematically brought together. The Eastern Manuals have recognized three species; the Botany of California describes two (one of them also eastern), four new species have recently been named, another (if my supposition is correct) frequent in the alkaline area of the Andes, extends to Southern California, and still another, abundant in the Mediterranean region, is found in our Western and Southern States. I have not ventured to unite any of these species, nor to describe any more, although there are plenty of indications from the herbaria that other forms, species or varieties will sooner or later claim recognition. I have thus recognized ten species, all but one of which occur within the United States. The apparently great divergence from the views of the eminent English and French authors above mentioned is readily explicable by stating that the material on which the additional five or six species I have been able to recognize is based, is quite new, and none of them have been studied by either Bentham or Baillon. It is to Professor Greene that I am indebted for much of the material which has thrown most light on the Pacific Coast forms, and he informs me that he has evidence of the existence of other forms, specimens of which in satisfactory amount and condition for critical study are not yet available. So far as the twenty-five species recognized by Kindberg are concerned, I am entirely satisfied that they are mainly artificial, and actually represent not many more than the three or four of Bentham or Baillon.

It is hardly necessary that I should discuss the generic name of these plants; Professor Greene has very recently alluded to it in "Pittonia," and M. Baillon has adopted it in his "Histoire." Suffice it to say that there is no valid choice in the matter, for 1763, the date of Adanson's "Familles des Plantes," is fifty-four years before the publication of *Lepigonum*, and a little more than that earlier than *Spergularia*. There is no doubt whatever as to what Adanson meant, and hence it becomes a matter of mere priority of publication, for which fifty-four years will be considered ample, I believe, by even the most conservative. Adanson considered that the species known at his time formed two genera, and called the other one *Buda*, under which species have been named by DuMortier in his "Florula Belgica;" this view has not been accepted by any recent botanist, and as *Tissa* occurs first in Adanson's work, it has priority of place and must stand as the generic appellation of these interesting plants.

Through the courtesy of Mr. Redfield and Dr. Watson I have been able to make quite careful examinations of the materials in the Cambridge and Philadelphia herbaria.

(A) ANNUALS; ROOTS FIBROUS.

* Species of the sea-beaches or salt-marshes or of the borders of salt lakes; leaves very fleshy; stamens (always ? 10;) petals pink, (varying to white ?).

1. TISSA MARINA (L.) (*Arenaria rubra*, L., var. *marina*, L., Sp. Pl. 606 (1753); including *Lepigonum marinum*, Kindb.

Monog. 18, at least in so far as the North American plants are concerned, *Lepigonum medium*, Fries and *L. leiospermum*, Kindb. l. c. 23).

Stout, erect or ascending, smooth or glandular-pubescent; capsule 5–8 mm. long at maturity; pedicels short (seldom more than twice this length); seeds smooth, margined or marginless, or roughened with projecting points or processes, several kinds sometimes found within the same capsule; leaves often much clustered in the axils.

Hab. Along the whole coast on both sides of the continent, apparently less abundant on the Gulf of Mexico; also about saline lakes and on alkaline soil in the interior.

2. TISSA SALINA (Presl.) (*Spergularia salina*, Presl. Fl. Cech. 93 (1819,) *fide* Kindberg.

Slender and spreading, low, abundantly branching, generally diffuse, and apparently always so in its fully developed state, entirely smooth; pedicels long, slender, more than twice the length of the capsule, which is 4-6 mm. long at maturity and twice the length of the calyx; leaves generally simply opposite; seeds papillose or smooth.

Hab. In the sand or mud of sea-beaches, more rarely (if at all) on the meadows, coast of New England and Canada. Not seen from further south than Eastport (Farlow) or South Gouldsboro (Redfield).

This is an extremely well marked species, as I understand it, and I have little doubt that it is the same thing that occurs on the shores of northern Europe, although comparison with more European specimens is very desirable. This restricts its range much within the limits assigned by Kindberg, who by going mainly upon the seeds has included in this, as in other species, a large number of diverse elements. Certainly in these two species the seed characters are of but little value.

*** * Species of non-saline distribution.**

† Petals pink.

3. TISSA RUBRA (L.) (*Arenaria rubra*, L. l. c.; *Spergularia rubra*, Presl; *Lepigonum rubrum*, Fries).

Depressed, spreading or ascending, very leafy to the flowers; stipules ovate-lanceolate, acuminate; plants smooth or but slightly pubescent.

Hab. In dry, especially sandy soil along both the Atlantic and Pacific coasts, not seen west of the Alleghanies nor east of California, and generally appearing as if introduced. Indeed I have not met with evidence that it is really indigenous in East America, and from its being so common a weed in Europe, our plant may very likely be of exotic origin.

4. TISSA DIANDRA (Guss.) (*Arenaria diandra*, Guss. Fl. Sic. Prodr. 1, 515 (1827); *Arenaria salsuginea*, Bunge in Ledeb. Fl. Alt. ii. 163 (1829); *Lepigonum salsugineum*, Kindb. l. c 42 and Syn. 7).

Spreading or bushy branched from the base; stipules ovate, acute; peduncles leafless or nearly so; plant glandular pubescent.

Hab. Galveston, Texas (Lindheimer); Rio Brazos, Texas (Drummond, 97 in Herb. Gray.); Sierra Valley, Cal. (Lemmon, 1874, doubtfully referred to this species); sandy bank of the Columbia River, W. Klickatat Co., Washington (Suksdorf, 176); also collected by Mr. Henderson in the same region in 1885. Our plant agrees very nearly with authentic specimens from Arabia. Its specific separation from *T. rubra* is open to question.

† † Petals none.

5. TISSA GRACILIS (S. Wats.) (*Lepigonum gracile*, S. Wats. Proc. Amer. Acad. xvii. 367 (1882).

Capsules 2-4 mm. long, slightly exceeding the calyx; seeds tuberculate; plants small and delicate, 4-8 cm. high.

Hab. Los Angeles, Cal. (Parry, No. 15, 1881); Otay, San Diego Co. (Orcutt, 1201); wet sands near Dallas, Texas (Reverchon in Curtiss, No. 333* distributed as *S. Mexicana*, Hemsl.)

6. TISSA TENUIS, Greene in litt. (*Lepigonum tenue*, Greene, Pittonia, i. 63 (1887).

Capsules 6-8 mm. long, twice the length of the calyx; seeds smooth, plants much larger, and more branched than in the last.

This fine species may, perhaps, better be grouped with Nos. 1 and 2, as its habitat appears to be near the sea, if not, indeed within its influence.

Hab. Alameda, Cal. (Greene); Santa Barbara (Rothrock, 154); Santa Monica (J. C. Nevin).

(B) PERENNIALS; STEMS CÆSPITOSE FROM A THICK, WOODY ROOT.

* **Maritime or alkaline flat species of the Pacific Coast.**

7. TISSA MACROTHECA (Hornem.) *Arenaria macrotheca*, Hornem. in Cham. & Schlecht., Linnæa, i. 53 (1826); *Lepigonum macrothecum*, Fisch. & Meyer, Cat. Sem. Hort. Petrop. 1835).

Leaves broadly linear, 2-3 mm. wide, 2-5 cm. long; stems stout, ascending; plants dark green, entirely smooth or densely glandular pubescent.

Hab. Oak Bay, Vancouver Island (Macoun) and southward to Southern California both maritime and inland, as on "alkaline lands San Bernardino Valley, perennial, fleshy rooted, almost tuberous," (Parish, 1331).

Var. SCARIOSA, n. var. Low, (2-10 cm.), glandular; leaves broader, lanceolate-linear, crowded; stipules very large and conspicuous, ovate-acuminate, nearly as long as the leaves.

Hab. Near San Francisco (Torrey, No. 41); coast of Monterey (Hooker and Gray, 1877); and Cypress Point, near Monterey, on maritime rocks (Gray, 1885).

8. TISSA PALLIDA, Greene, in litt. Leaves broadly linear, ½ cm. long, smooth; pedicels, calyx and upper portion of the stem densely glandular pubescent, lower leaves and joints of the stem smooth; plants stout, very light colored, whence the name.

Hab. Clayey bluffs overhanging the sea, prostrate, forming dense tufts, near San Francisco, June, 1887 (Greene); Monterey? (Meehan in Herb. Phila.).

9 TISSA VILLOSA (Pers.), Britt., Bull. Torr. Club, xvi. 62.

Leaves filiform-linear, densely clustered in the lower axils, stems erect or ascending, slender, glandular pubescent; plant dark green.

Hab. In alkaline soil, Southern California, San Diego, (Cleveland, 526); alkaline ground, San José (Mrs. A. E. Bush, 1879). Also in western South America. The Californian plants differ very slightly from Andean specimens in having smaller capsules, but I have little hesitation in referring them to this species.

* * **Species of the mountainous regions of North Mexico.**

10. TISSA MEXICANA (Hemsl.) (*Spergularia Mexicana*, Hemsl. Bot. Biol. Cen.-Amer.).

Leaves hardly succulent, flowers "yellowish."

Hab. Near San Luis Potosi (Parry and Palmer).

The Germination of Pollen.*

Cultivating pollen grains in the ordinary way laid down in the books, although satisfactory in results, has proved too laborious when it is desired to provide tubes in considerable quantities, as for example, for use by classes in laboratory practice. As a primary variation from the inverted drop upon the cover glass, the sugar solution was placed upon glass slides and pollen dusted into it. The slides were placed upon a small block of wood in a dinner-plate and over all a bell jar lined with filter paper dipping into the water upon the bottom of the plate. Under such treatment the tubes push out with surprising vigor. When it is desired to study the germination, a portion of the syrup may be removed to another slide, a cover-glass applied and the preparation is ready for the high power. However, the progress of germination can be watched upon the original slide by placing it under a low power and without a cover-glass. This method proved so successful that watch-glasses were next employed, and these were more convenient for holding the sugar solution and did not prevent the general study with low objectives. However, with abundance of material it is easier to dip out a portion, apply the cover-glass and look immediately with the higher powers.

As a next step, artists' porcelain well–slabs were obtained. Some of these slabs contained eight wells of the size of watch-glasses, one slab fitting over and becoming a cover for the one below. Slabs with smaller wells, twenty-one in number, and provided with special covers, have proved the most convenient. The record of the pollen placed in each particular well can be conveniently kept upon a paper marked with numbers to correspond with the wells. Labels pasted upon the spaces between the wells have not proved satisfactory. The wells may be left open to the sunlight by placing a glass bell jar over them. The rapidity with which moulds develop in the syrup will suggest the importance of taking all precautions to exclude germs from the cultures.

A supply of sugar solution is easily kept of full strength in a bottle having a bulb-stopple, with which it can be dropped into the well and diluted to the desired strength as required.

With these slabs, pollen of many sorts can be similarly tested at the same time, as for example, of a half dozen varieties of apples, corn, etc.; or the same kind of pollen may be treated to different strengths of the sugar solution, all other conditions remaining the same. For example, the pollinia of four native Asclepiads were tested in this manner. The pollinia were placed in pure water, 10%, 25%, 50%, 75% and full strength. The tubes developed from the outer angle of the pollinium in all these cases, but with water the growth was small in both number and length of tubes. The same was true of the full strength and the best results were obtained with the 50% and 75% solutions, the percentage indicating that with *Asclepias verticillata*, for example, the most favorable strength is 65%.

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* Read at the A. A. A. S. meeting at Cleveland in 1888.

As another illustration, the white variety of *Tradescantia Virginica* has 15% of abortive pollen and the normal form only 2%. The perfect pollen of both sorts germinate with equal rapidity, frequently tubes of 100 μ in length being produced in two hours.

These wells are adapted for the study of the two kinds of pollen in dimorphic plants. As far as experiments have gone in this direction the indications are that the larger pollen, designed for the long styles, germinate quicker and the tubes grow more rapidly than with the smaller grains.

Some kinds of pollen seem to be quite indifferent to the strength of the solution. Others are extremely sensitive and only respond when all conditions are most favorable. A decided lowering of the temperature is quite sure to check the activity of pollen. Many tests will terminate negatively during a cold summer rain. As far as observed, light—the heat remaining constant—has no influence. It has been a common practice to set pollen for germination at nightfall and get a supply of tubes the next morning.

Only a little work has been done in growing pollen upon foreign stigmas, but enough to indicate that many kinds of grains are not inactive upon the stigmas of other than the same species. The lily family affords good subjects for this study, as the stigmas are frequently large and adhesive. *Erythronium albidum*, for example, when in the center of a boquet of other flowers, may furnish stigmas bearing several sorts of germinating pollen.

Rutgers College. BYRON D. HALSTED.

Flora of Richmond Co., N. Y.—Additions and New Localities, 1886-1889.

APPENDIX NO. 5.

Clematis ochroleuca, Ait. Sand dune on the borders of salt meadows, near Watchogue. A number of plants of the lobed leaved form with it. (Wm. T. Davis.)

Ranunculus septentrionalis, Poir. Clove Lake swamp. A remarkable tendency to fasciation has been found in these specimens.

Nasturtium sylvestre (L.), R. Br. Woods of Arden, near the shore. (Mrs. N. L. Britton.)

Lechea racemulosa, Lam. "Tottenville," *fide* specimens in Herb. W. H. Leggett.

Drosera intermedia, Drev. & Hayne, var. *Americana*, DC. Clove Lake swamp.

Malva sylvestris, L. New Brighton. Escaped from gardens. (Wm. T. Davis.)

Trifolium hybridum, L. New Brighton. Becoming common.

Lathyrus maritimus (L.), Bigel. New Dorp.

[*] *Rosa humilis*, Marshall, var. *lucida* (Ehrh.), Best. (?) "Stat. Is. west side, July 22, 1869." (W. H. Leggett.)

Cratægus coccinea, L. Tottenville. (Wm. T. Davis.)

Tiedemannia rigida (L.), Coulter & Rose, var. *longifolia* (Pursh), B. S. P. Garretsons.

Lonicera xylosteum, L. Admitted into the 4th appendix under the name *L. ciliata*, Muhl., from flowering specimens obtained from a single bush near Garretsons. The same plant has lately been found by Mr. Wm. T. Davis, at New Brighton. It appears to be thoroughly naturalized at both localities, and probably grew from seeds transported by birds.

Aster spectabilis, Ait. Mariners' Harbor.

Aster cordifolius, L., var. *glabratus*, Porter. Frequent.

Aster cordifolius, L., var. *lanceolatus*, T. C. P. Egbertville.[†]

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[*] *Rosa humilis*, Marshall—and *Rosa humilis*, Marshall, var. *villosa*, Best, replace the *R. lucida*, Ehrh. of our catalogue.

([†] MEM.—The *Aster*, admitted into our original catalogue under the title *A. sagittifolius*, Willd., has been determined by Prof. T. C. Porter to be a form of *A. cordifolius*, L., and the former species must therefore be omitted from the list.)

Aster Novi-Belgii, L., var. *lævigatus* (T. & G.), Gray. Ocean Terrace. Rare.

Aster Novi-Belgii, L., var. *elodes* (T. & G.), Gray. Garretsons. In swamps along salt meadows.

Solidago patula, Muhl. Mariners' Harbor.

Heliopsis helianthoides (L.), B. S. P. Kreischerville.

Helianthus grosse-serratus, Martens. ? Green Ridge.

Lactuca hirsuta, Muhl. New Dorp.

Gaultheria procumbens, L. Eltingville.

Pyrola secunda, L. Richmond.

Pycnanthemum incanum (L), Michx. Ocean Terrace.

Lophanthus nepetoides (L.), Benth. Tottenville.

Cynoglossum officinale, L. Richmond. Rare. One plant near Concord, 1880. One plant near Richmond, 1888.

Sabbatia dodecandra (L.), B. S. P. Kreischerville. Abundant in salt meadow.

Amarantus hybridus, L. Streets of New Brighton.

Juglans cinerea, L. South shore of Staten Island. (Samuel Ackerly, in Trans. N. Y. State Agric. Soc., 1843, under name of *J. cathartica*, Michx.) Recently reported by W. T. Davis as abundant along Sandy Brook in Westfield. (See Proc. Nat. Sci. Assoc. S. I., April, 1889.)

Hicoria alba (Nutt.), Britton, var. *maxima* (Nutt.), Britton. Court House.

Quercus Phellos, L. Tottenville. (Wm. T. Davis.) A number of trees have been discovered since the original find noted in the 1st Appendix for 1879.

Quercus ilicifolia, Wang. Watchogue.

Quercus Rudkinii, Britton. Tottenville. (Wm. T. Davis.)

Quercus heterophylla, Michx. f. Tottenville. (Wm. T. Davis.)

Betula nigra, L. Very rare. Since the original find near Bulls Head, Mr. Wm. T. Davis has noted one tree near Old Place, two at Tottenville and four at Richmond—all young.

Salix candida, Willd. Garretsons.

Salix tristis, Ait. Tottenville.

Salix purpurea, L. Garretsons, Woodrow and Old Place. Probably originated from cuttings of cultivated trees thrown aside in brush heaps.

Tsuga Canadensis (L.), Carr. Old Place. One tree.

Zannichellia palustris, L. "Staten Island." (Flora of New York).

Potamogeton pauciflorus, Pursh. Woods of Arden.

Potamogeton pulcher, Tuck. Woods of Arden.

Microstylis unifolia, Michx. Egbertville. (Mrs. N. L. Britton.) (The second time that a single plant has been discovered.)

Smilax glauca, Walt. A form of this species grows abundantly on the sand near Mariners' Harbor, Tottenville and Kreischerville, which is apparently *S. spinulosa*, Smith.

Chamælirium luteum (L.), Gray. Court House. (K. B. Newell.)

Juncus Balticus, Dethard, var. *littoralis*, Engelm. New Dorp.

Juncus dichotomus, Ell. Mariners' Harbor.

Eleocharis tuberculosa (Michx.), R. Br. Mariners' Harbor.

Carex glaucodea, Tuckerm. Fields, Court House.

Panicum latifolium, L., var. *molle*, Vasey. New Dorp.

Panicum nitidum, Lam., var. *ramulosum* (Michx.), Vasey. Frequent or occasional.

Cystopteris fragilis (L.), Sw., var. *dentata*, Hook. Near Egbertville. This was wrongly determined to be the typical form and as such was admitted into the original catalogue. A few specimens only of the type have been found, near Martling's Pond.

Onoclea sensibilis, L., var. *obtusilobata*, Torr. New Dorp. (Mrs. N. L. Britton.)

Azolla Caroliniana, Willd. Naturalized in pools in the Clove Valley.

ARTHUR HOLLICK,
N. L. BRITTON.

Observations upon Pollen Measurements.[*]

Of forty-one kinds of pollen taken at random and included in twenty orders, sixteen were isodiametric or spherical in shape, while twenty-five were with unequal diameters and generally oval in outline. The range in size in the isodiametric sorts was from 13–17 μ in *Onosmodium molle* to 110–117 μ in *Geranium maculatum*, and 130–138 μ in *Œnothera biennis*, which latter has, however, a spherical center with a number of large broad projections.

In the groups with unequal diameters the range of sizes is practically the same as given above, namely: 13–20 μ by 27–37 μ in *Steironema lancolata* to 45–50 μ by 120–135 μ in the Day Lily.

In making the record for each sort, the shortest as well as the longest distance was taken in each case and the grains were measured dry and again after becoming thoroughly wet with water.

Returning to the spherical group, the average of all the shortest diameters for the whole sixteen is 57.7 μ and for the longest 66.3 μ, thus giving a range of 8.6 μ. By taking the similar parallel series of measurements for wet grains the average for the shortest diameters is 68.6 μ and the longest 74.5 μ, or a variation of 5.9 μ. The average of the two averages for the dry measurements give 62 μ, while the same of wet grains is 71.55 μ, thus giving the increase from the addition of water of 9.55 μ, or 15.4%.

Turning now to the oval group, the average of the short diameter is 26.2 μ and of the long 48.4 μ; the same when wet are 34.9 μ and 42.5 μ respectively. In other words, there is 33.2% increase of the short diameter in the wetting, while the decrease in the longer diameter is 12.2% !

Pollen when dry, that is, freshly taken from the dehisced anther, shows some things not seen in the same after it has become wet. Of course the natural shape of the dry pollen is destroyed by the wetting process—as the above figures plainly show. Many grains have characteristic folds which are lost from view when liquid expands the coats. Only one of these folds is usually seen in side view, but by looking at one end there are usually three observed. Some grains, like many kinds of mint pollen, are flat, that is, somewhat flax-seed shaped. In *Monarda fistulosa*, for example, the grains are $55-56\,\mu \times 64-67\,\mu$ when viewed flatwise, and each grain is traversed by three folds, making the grain resemble a miniature muskmelon. When water is added the grain changes its shape with surprising rapidity, the longer diameter becomes the shorter and the shorter the longer, with little variation in the original figures. Dry pollen has the outer coat uniform, while in the wet grains there may be broad belts or lines of a different exterior. The pores are not usually so evident in the dry pollen as when they are wet. It is more difficult to get a satisfactory measurement of a dry grain, as it may be partly collapsed or the light so broken that no distinct outline is seen.

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[*] Read at the Cleveland meeting of the A. A. A. S., Aug., 1888.

It seems evident that the full and perfect measurement of a pollen grain requires that it be taken twice; once when dry, that is, in the condition when ready for passage from dehisced anther to stigma and again when fully swollen by the imbibition of water, and both figures should be given with the conditions for each.

Rutgers College. BYRON D. HALSTED.

Botanical Notes.

Notelets.—Last summer I noticed *Tragopogon porrifolius* established at West Point, N. Y. *Hieracium aurantiacum*, known now some ten years in the vicinity of Providence, is spreading slowly in this vicinity, and I have recently learned of its appearance at Lebanon, N. Y. Mr. Bennett tells me that *Humulus Japonicus* threatens to be a bad weed hereabouts. *Forsythia suspensa* has flowered here, out of doors all winter.

On Feb. 26th I found a clump of *Houstonia cærulea* in full flower. This is my earliest recorded date for Providence in 26 years. *Acer dasycarpum* had then been in bloom some days.

PROVIDENCE, R. I. W. W. BAILEY.

Solanum rostratum was brought to me here last fall gathered near the D. L. & W. R. R. tracks in the village. *Blephilia ciliata* has been found by one of my students in a wild place at Binghamton.

WAVERLY, N. Y. C. F. MILLSPAUGH.

I have read the note on two-leaved *Pinus rigida* in the March BULLETIN with much interest. Between Sergeantsville and Stockton, Hunterdon Co., N. J., are several small trees of *P. rigida* having but two leaves in a fascicle.

WASHBURN, MINN. R. E. SCHUH.

The proposed New York Botanical Garden is briefly referred to in No. 57 of "Garden and Forest," where an account of the old Hosack Garden may also be found.

Reviews of Foreign Literature.

The Flora of West Yorkshire, with a sketch of the Climatology and Lithology in connection therewith. By Frederic Arnold Lees. London: Lovell, Reeve & Co., 1888.

The object of this work as stated in the "Foreword," is:—(1) to sketch the climate of the West Riding of York and show the limits imposed by its various factors upon those *floral* integers that make up the sum of its vegetation; (2) to connect the facts concerning soils and rocks in respect to their behavior under disintegration, and indicate the influence exerted by their conditions upon horizontal species-distribution; and (3) to furnish botanical collectors or students with a *Flora*—a list of the species found within the Riding, that shall be not merely a guide to the localities where they grow, but a history (with dates) so far as the area is concerned, of each one as well.

This object appears to be very fully attained in this thick octavo of 843 pages. It contains a map of the West Riding, 9 inches by 7, colored to represent the broad features of lithology as affecting plant distribution, and to show the natural river-basin areas. Then follow 60 pages devoted to the climatology, and 20 pages to the lithology. There are 13 pages of the bibliography of West Yorkshire Botany, between the years 1548 and 1885, with an additional three pages in the appendix extending the dates to 1887. Under this head 209 titles are given, embracing works including references to this region by William Turner, John Gerarde, Parkinson, Ray, Dillen, Curtis, Withering, Sowerby, Evelyn, Henfrey, Baker and others.

The *Flora* proper occupies 705 pages and "is perhaps the most complete work of the kind ever issued for any district, including detailed and full records of 1,044 phanerogams and Vasculav Cryptogams, 11 Characeæ, 348 Mosses. 108 Hepaticæ, 258 Lichens, 1,009 Fungi, and 382 Freshwater Algæ, making a total of 3,160 species.

There are also three indexes: one to the preliminary chapters and explanations; one to the families and genera; one to the common and rustic names.

The whole has been done with great care and forms a worthy monument to the author's love for his subject extended over many years.

JOSEPH JACKSON.

The Development of Pilularia globulifera, L. D. H. Campbell, (Annals of Botany, ii, 233-264, Plates XIII., XIV., XV.) Two objects, the author states at the beginning of this paper, were in mind during the study: "1st, the investigation of the life history of *Pilularia globulifera*; and 2nd, to determine how far the paraffin imbedding process was of practical application in the study of vegetable embryology." By the successful operation of the methods of the second, the author has succeeded admirably in the first undertaking, since we have presented by far the most complete account of the life history of *Pilularia* that has yet appeared, correcting in more or less detail, some of the misconceptions of earlier investigators.

The methods of germinating, the characters of the microspore and macrospore, the growth of the prothallia, male and female, as well as the growth of the embryo after fertilization, are discussed in detail. The field opened up by Dr. Campbell in his studies of the life history of the Pteridophytes is a large and interesting one and will doubtless clear up many points relating to the classification of our species. At the close of the paper a doubt is suggested in regard to the supposed close relationship of the Salviniaceæ and the Marsiliaceæ; we have always supposed them worthy of separation in ordinal ranks The paper is very fully illustrated with three double page plates.

L. M. U.

Index to Recent American Botanical Literature.

Apple Twigs—A Chemical Study of. G. E. Patrick. (Bull. No. 4, Iowa Agric. Exp. Sta., 99–103).

Apple Twigs.—An Investigation of. Byron D. Halsted. (Bull. No. 4, Iowa Agric. Exp. Sta., 104–132).

Barnardesia rosea. (Gard. Chron., v. 300, fig. 55).

Botany in the High School. Volney M. Spaulding. (Michigan School Moderator, ix. 333–336).

Calochortus Obispoensis. (Garden and Forest, ii. 160, Fig. 101).

Chestnut Tree—The. J T. Rothrock. (Forest Leaves, ii. 35, 36; illustrated by a plate of the large tree at North Brook, Chester Co., Pa.)

Contributions to the Life Histories of Plants, Nos. II and III. Thos. Meehan. (Reprinted from Proc. Phil. Acad. Nat. Sci., Oct. 9 and Nov. 27, 1888).

"Some new facts on the life history of *Yucca*,"—"A study of the *Hydrangea* in relation to cross-fertilization,"—"On the forms of *Lonicera Japonica*, with notes on the origin of the forms,"—"*Smilacina bifolia*," with reference to the relative number of stomata on the upper and lower leaf surfaces,—"Dichogamy and its significance,"—"*Trientalis Americana*," which is noted as being stoloniferous, also a list of comparatively local plants found in the companionship of *Trientalis*, June 3d,—"On the glands in some Caryophyllaceous flowers," are the subject headings of the articles included in these papers. Most of these will be recognized by botanists as having been presented in abstract at the meetings of the A. A. A. S.

Dicentra Cucullaria and *D. Canadensis.* (Vick's Monthly, xii. 124, 125, illustrated).

Enumeratio Plantarum Guatemalensium imprimis a H. De Tuerckheim collectarum. Pars i. John Donnell Smith. (8vo. pp. 68, Oquawka, 1889).

This is the list of tickets for the sets of specimens collected in Vera Paz, Guatemala, by Herr Von Turckheim which Captain Smith has so carefully studied for several years, and which he is now very generously preparing for distribution in the principal American and European herbaria. The new species have been described in the Botanical Gazette and noted in these columns.

The author is now himself in Guatemala, where we hope and confidently expect that he will secure additional materials for study.

Fungi Fuegiani. C. Spegazzini. (Boletin Acad. Nac. Ciencias Cordoba, xi. 135–308).

A list of 461 species, a large number of them new to science, from the southernmost portions of South America.

Fungi Guaranitici Pugillus II. C. Spegazzini. (Anales Soc. Cientif. Argentina, xxvi. 5–74).

A list of 202 species from the Argentine Republic, including a large number of novelties.

Helianthus mollis, Lam. var. *cordatus*, S. Watson. (Garden and Forest, ii. 136, fig. 100).

A new variety founded upon specimens raised at the Arnold Arboretum from seeds sent by Mr. N. T. Kidder, from the southwestern United States.

Hypericum aureum.—C. S. S. (Garden and Forest, ii. 184, fig. 103).

Jamaica—Bulletin of the Botanical Department.

Under the head of "Plant Notes," by W. Harris, is a list of ten species of native *Ipomœas* cultivated in gardens.

Journal of André Michaux, 1787-1796. (Proc. Amer. Phil. Soc. xxvi. pp. 145, with an introduction and notes by C. S. Sargent).

We learn from the preface that the second part of his father's journal was presented to the Society by the younger Michaux in 1824, the first portion, including the years 1785–1787, having been lost. The second part is printed as Michaux wrote it, and Prof. Sargent acknowledges the valuable assistance rendered by J. H. Redfield in preparing the manuscript for the press. A sketch of Michaux is given from a memoir by M. Deleuze published in the third volume of the Memiores du Museum National d'Histoire Naturelle, Paris, 1804, in which the following sentence occurs: "Michaux, accompanied by his son, then fifteen years old, arrived in New York in October, 1785. Here, during two years, he made his principal residence, establishing a nursery, of *which all trace has now disappeared*, and making a number of short botanical journeys into New Jersey, Pennsylvania and Maryland." This is not strictly true, as Michaux's garden was located at New Durham, N. J., and a description of it was given by H. H. Rusby in the BULLETIN, vol. xi. p. 88, and a few of the plants collected by him are still cultivated. Then follows the journal with continuous foot-notes, giving the daily experiences, names of plants collected, localities visited, etc., forming a most interesting contribution to our knowledge of the region traversed, and will serve as an excellent guide and pocket manual to those visiting the same localities. The sincere thanks of American botanists are due Mr. Redfield and Dr. Sargent for their work in editing this valuable manuscript.

Lælia albida. (Garden, xxxv. 314, 315, illustrated).

Lichenes Argentinenses—Observations in. J. Muller. (Flora, March, 1889, 62–68).

Miltonia Phalænopsis and *Miltonia vexillaria.* (Garden, xxxv. 269, illustrated).

Monotropa uniflora as a Subject for Demonstrating the Embryo-sac.—Douglas H. Campbell. (Bot. Gaz. xiv. 83, illustrated).

Monstera—Fibres and Raphides in Fruit of.—W. S. Windle. (Bot. Gaz. xiv. 67–69, Pl. X.)

Mosses found at Ottawa.—Description of new species of—N. C. Kindberg. (Ottawa Nat. ii. 154–156).

This includes seven new species selected from the collections of Prof. Macoun, because they were gathered near Ottawa, and descriptions of which are also given in the BULLETIN (xvi. pp. 91–98). Had we known that the Naturalist contained the descriptions, we should have omitted them from the BULLETIN, but the number was not received till our first form was printed. In the case of *Dicranum scopariforme*, n. sp., it is just as well, as Prof Kindberg has changed his mind about its specific rank and reduces it to a variety of *D. scoparium.* E. G. B.

Nelumbium Naturalized in America.—The Oriental. E. D. Sturtevant. (Garden and Forest, ii. 172, 173, illustrated).

An account of the successful attempt to naturalize *Nelumbo speciosa*, near Bordentown, N. J., where it has spread over about three-fourths of an acre. It is apparently not averse to terrestrial life, as an occasional plant is said to creep a few feet out into the adjoining thicket of alders and wild roses.

A memorandum of this occurrence may be found in the BULLETIN, vol. xv. 176.

Pinus Jeffreyi. (Gard. Chron. v. 360, 361 ; figs. 65 and 68).

Pangenesis.—Intracellular. J. W. Moll. (Bot. Gaz. xiv. 54–66).

Protoplasm.—Continuity of—John M. Coulter. (Bot. Gaz. xiv. 82, 83, illustrated).

Roses Americaines—Nouvelles Remarques sur les. (Continuation) François Crépin. (Compt. Rend. Séance Soc. Roy. Bot. Belg., 1889, 18–33).

The author gives us a critical treatise upon the species *lucida, humilis, Caroliniana* and *Arkansana,* based upon the study of a large amount of material from Drs. Best, Porter, Watson, and others. His remarks, especially in regard to the supposed relationship between the first two, are of more than ordinary interest, and he calls upon American botanists to carefully observe and verify certain points during the coming season. The monograph of Dr. Best* was a surprise to him, and he admits, has rather shaken his belief in the specific rank of *R. lucida,* although previously thinking it a good species. He greatly desires complete specimens of the plants identified in America as *R. lucida*, as he says he has failed to find a single specimen in all the material thus far sent to him, which he can refer to typical *R. lucida.* The specimens labelled var. *lucida* by Drs. Best and Porter were only variations of *R. humilis.* The plant known in cultivation in Europe for more than two centuries as *R. lucida* is entirely distinct from any of the specimens which he has received from America, and he now questions whether this plant may not be after all only one whose characteristics have been fixed by cultivation. In speaking of the work of our botanists in this direction M. Crepin is rather severe. He says. "This confusion of the two species need not surprise us in view of most of the American descriptions of *R. lucida.* In Watson's recent monograph the descriptions of *R. lucida* and *R. humilis* * * * often embarrass the observer in distinguishing one from the other." The characters relied upon by Dr. Watson he considers too vague and indefinite to separate robust forms of *R. humilis* from *R. lucida*, as both are liable to and occasionally do have the same characteristics in common. The difference of opinion on the part of American botanists surprises him, as in Europe there has never been any question in regard to the specific rank of the two forms. Attention is then called to several points which merit careful observation. Thus *R. humilis* is stated to produce long roots, which extend for some distance, producing suckers which eventually replace the parent plant. Earlier botanists do not seem to have mentioned this characteristic, although Lindley remarks that it is difficult to cultivate and especially to multiply, which was probably due to the fact that these suckers were generally destroyed and the original plants thus permitted to perish. It is no doubt due to this cause that it has disappeared from cultivation. Per contra, *R. lucida*, which is still common in cultivation, forms permanent bushes, more or less tall and compact, increasing in size year by year, and producing no stolons or suckers. It is for American botanists to determine whether these points of difference hold good in the native plants, and if so, M. Crepin thinks that it will be a strong argument for their specific rank. There are also other points of difference in the inflorescence, prickles, texture and autumnal coloring of the foliage, etc. Finally, the careful study of the bract and sepals is urged,—the latter in regard to position and appearance before and after maturity; the degree of decay of the petals, odor of the flowers and exact time of flowering of the two species in any one locality.

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*See Bull. Dec. 1887.

In regard to *R. Carolina* there seems to be no doubt in his mind as to its specific rank, and he contends that the alleged intermediate forms, which Best says seem to connect with *R. humilis*, are most probably due to hybridization between the two species! He urges special study in this direction, as he cannot imagine two species so entirely distinct being connected in any other way.

Rosa Arkansana is treated in a very summary manner and the characters relied upon by our botanists to distinguish it from *R. blanda* are referred to as having but little value. Our authorities are taxed with having given to mere accident of growth a specific value, and also with emphasizing supposed points of difference which are in reality common to both species in many cases. M. Crepin says thas while he has striven to demonstrate the uselessness of the characters proposed for maintaining *R. Arkansana* as a species distinct from *R. blanda*, yet he does not intend to deny all specific value to it. He thinks that it may possess specific differences, but, if so, they are yet to be discovered. He is inclined to believe that *R. Arkansana* is a form derived from *R. blanda*, which might, at most, be made a species of the third order.

M. Crepin concludes by saying : "From these remarks one is readily convinced that all the species from North America are far from being well known and that much remains to be done in order to make them completely clear * * * but the hint is given ; we are persuaded that our American confreres will make rapid progress in the knowledge of their rose flora." A. H.

San Benito Islands.--Vegetation of the. Edward L. Greene, (Pittonia, i. 261–266 ; advance sheets).

From collections made on these islands, lying twenty miles west of Cedros Island, by Lt. Chas. F. Pond, U. S. N., Professor Greene is enabled to list twenty-four species of plants of which the following are new : *Euphorbia benedicta*, *Atriplex dilatata* and *Cryptanthe patula ;* the name *Suæda Torreyana* is corrected to *S. Moquini*, the plant being first named *Chenopodina Moquini* by Dr. Torrey. But two species in all have previously been known from these little visited islands.

In the same pages is begun a supplementary enumeration of Cedros Island plants, collected by the same gentleman. *Eriogonum taxifolium*, *E. Pondii*, *Mamillaria Pondii*, *Lycium Cedrosense*, *Physalis pedunculata*, sp. nn. show that the flora of our Southwestern Archipelago is not yet, by any means, entirely known.

Senega Wurzel. J. U. Lloyd. (Pharm. Rundsch. vii. 86–89, illustrated.)

Shortia galacifolia. (Gard. Chron. v. 397, 398 ; fig. 73.)

An attempt is apparently being made to introduce it into cultivation in England, and Mr. Elwes, who was the first to exhibit it in that country, received the award of a first-class certificate from the Royal Horticultural Society. The article fails to state from whence the plants were obtained.

Sorghum.—Some Comparisons of varieties of. G. H. Failyer.—

Sorghum Blight.—Preliminary Report on. W. A. Kellerman (Bull. No. 5, Experiment Station, Kan. Agric. Col.)

Starch in the Potato Tuber.—The Distribution of. E. S. Goff. (Agric. Sci., iii., 55–58.)

Staten Island.—New and Noteworthy Additions to the Flora of. Arthur Hollick. (Proc. Nat. Sci. Assn. of S. I., Mch. 14, 1889.)

Sweet Cassava. H. W. Wiley. (Bot. Gaz. xiv., 71–76.)

Tree Growth as Determined by Location. J. T. Rothrock. (Forest Leaves, ii. 18, 19; illustrated.)

Excellent pictures are given of *Quercus alba*, showing the types found in open ground and in woodland.

Tournefortia cordifolia. (Garden, xxxv. 223, 224; illustrated.)

Viburnum Opulus, L.—C. F. Millspaugh, M.D. (The Homœpathic Recorder, iv. 2, 55.)

An account of its uses in homœpathic practice; with plate.

Weeds.—Our Worst. Byron D. Halsted. (Bot. Gaz. xiv. 69–71).

This is a preliminary report upon the facts gathered from the answers received in reply to a request for a list of the twenty worst weeds in any locality. From twenty-five such lists the author finds the relative abundance and injuriousness of thirty-four weeds. *Portulaca oleracea*, *Ambrosia artemisiæfolia*, *Chenopodium album* and *Rumex crispus* lead in point of numbers. In regard to injuriousness *Cnicus arvensis*, *Agropyrum repens*, *Xanthium Canadense* and *Cenchrus tribuloides* are quoted as the four worst, in the order named, while *Ambrosia artemisiæfolia* is sixth, *Chenopodium album* twelfth, *Portulaca oleracea* fourteenth and *Rumex crispus* fifteenth on the list.

Willows—Notes on North American.—III. M. S. Bebb. (Bot. Gaz. xiv. 49–54, Pl. IX).

A new variety, *Salix Richardsonii*, var. *Macouniana*, is figured and described. Interesting criticisms and notes on *S. Richardsonii* and *S. Barrattiana* are also given.

Proceedings of the Club.

The regular meeting was held Tuesday evening, April 9, 1889, the President in the chair and fifteen persons present.

A paper entitled "Notes on White Mountain Willows, III," by M. S. Bebb, was read by the editor.

Dr. Newberry showed cones of *Abies Engelmanni* collected by him in Colorado, and showed from many characters similar to those in *Abies Menziesii* why he considered the two species very closely allied if not identical.

A package of plants from Fort Niobrara, collected by Dr. T. E. Wilcox, was shown, and attention directed to the grass recently named by Dr. Vasey, *Panicum Wilcoxianum.*

Miss Cannon exhibited *Claytonia Virginica* and *Erythronium Americanum* in flower from High Bridge.

The President appointed the following Field Committee: Dr. H. H. Rusby, Mr. W. R. Mitchell, Miss L. M. Stabler, Mrs. N. L. Britton and Miss Phœbe McCabe.

At the adjourned meeting of April 24th the President occupied the chair and thirty-one persons were present.

The following Honorary Members were elected: Prof. Henri Baillon, Prof. Alphonse de Candolle, Dr. Joseph D. Hooker, Dr. C. J. Maximowicz and Dr. Julius Sachs. Miss Gertrude B. Pottes was elected an Active Member and Dr. Richard Spruce a Corresponding Member.

Mrs. Britton read a letter from Björn Lindberg, stating that his father's magnificent collection of mosses, 46,126 specimens in number, was for sale to the highest bidder.

The paper of the evening "Midsummer Weeds and Wild Flowers collected in Southern England, July–September, 1888," was read by Mrs. Britton and illustrated by many herbarium specimens.

Dr. Newberry noticed the announcement in "Nature" of a new *Rafflesia* quite as showy as *R. Arnoldi.*

Dr. Britton exhibited a curious seed from British Guiana, *Ophiocaryon paradoxum*, there called "snake-nut," because of the prevalent belief among the natives that the coiled embryo on falling to the ground was metamorphosed into one of the venomous snakes so common in that region. The nut is found around Demarara, and is yet a rarity among collectors, as it is said the natives cannot be induced to approach the trees.

BULLETIN
OF THE
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Notes on the Botany of Humboldt County, California.

By E. R. Drew.

The mountainous country occupying the northwestern part of California is one of the many portions of our western country concerning which our botanical knowledge is as yet very incomplete. The author was fortunate in being able to spend a few weeks during July and August of last summer in a collecting trip in that region. My companion was a fellow botanist, Mr. V. K. Chesnut, and our tramp extended from Eureka, on the coast, through the central part of Humboldt County, to Hy-Am-Pum Valley, which lies just over the eastern line, in Trinity County. The country being very rough, with but little arable land, is sparsely settled, and after leaving the coast, the pack-mule is, with few exceptions, the only means of conveyance. It is all that could be desired by the hunter and camper, and the botanist is richly rewarded for the few difficulties which he must overcome. Still the principal sources of knowledge regarding the interior flora have been a few collections made by botanists on rapid trips, similar to our own. To this stock of knowledge we are glad to be able to add a small fragment.

Beginning at the coast, the most striking feature is the redwood belt, extending ten to twenty miles inland at that point and covered with dense forests consisting almost entirely of *Sequoia sempervirens.* The redwood seems to thrive only in the regions visited by frequent fogs from the ocean, and this dampness, together with the shade and the rich soil, are conditions favorable to the support of a rank undergrowth, which is remarkable for the small number of its species and their uniform distribution; both facts to be accounted for probably by the uniformity of condition required by the redwood itself. We collected only about twenty-five species in this region, and could have found nearly the whole number along any given mile of trail.

On occasional plateaus and gently rounded summits in the higher portions of the belt, and becoming more numerous further on, where the redwood gives place to oak and spruce, are small patches destitute of trees, commonly known as prairies. In these, of course, the flora is of an entirely different character from that of the forests, and is also much more varied, so that in the western part of the county the greater number of species are to be found in these small prairies.

Getting farther away from the coast, the country becomes continually more broken, and the flora more diversified. Very few species are found continuously over any considerable area, and rapid changes within short distances are continually met with. When the county comes to be thoroughly explored, it will be found to have a greater number of practically distinct floras than many of the larger states. The passage over South Fork Mountain, in the eastern part of the county, offers perhaps as sudden and peculiar a change of flora as can be found anywhere. The mountain is a ridge extending in a nearly north and south direction for several miles, and reaching an altitude of perhaps six thousand feet, the two sides being of nearly equal slope. The western side is bare of trees, except for an occasional clump of oaks, but well covered with brush, which consists chiefly of *Ceanothus cuneatus*, replaced just at the summit by almost impassable thickets of *C. divaricatus*. This mountain side proved to be one of our richest collecting grounds, many species growing in abundance which were found rarely or not at all elsewhere. On the level space of sandy soil at the summit occurred some species peculiar to such situations, as the magnificent *Lilium Washingtonianum* of Kellogg, *Calyptridium nudum*, Greene, and a large form of the showy *Pentstemon Menziesii*, Hook. Just before beginning the descent we found a few specimens of *Pentstemon Rattani*, Gray, and then came the change. We passed suddenly into the shade of a dense forest of coniferous trees, principally the Douglas Spruce, which covered the whole mountain side so thickly as to permit only occasional glimpses of the surrounding country; the few plants which flourished among the trees were chiefly Ericaceous, and there was created a general impression of having been suddenly transported through several degrees of latitude. It was here that we found the excellent new Lupine, described farther on under the name of *L. sylvestris.*

At the foot of the mountain lies Hy-Am-Pum Valley, a pleasant little spot, through which flows the South Fork of Trinity River. We explored the river banks and adjoining slopes for some twelve miles, to the mouth of Grouse Creek, and found the extensive and interesting flora to be practically distinct from anything west of the mountain, so that the summit of South Fork would seem to be a dividing line of some importance. In returning, we followed up Grouse Creek, around the northern end of the mountain, and crossed Redwood Creek near its source. Here the line of division is much less clearly defined, but seems to pass along the eastern ridge above the valley of Redwood Creek. From this point to the coast no new features of importance were noticed.

As a complete list of our collection would occupy too much space, only a few of the more important finds will be given, together with the descriptions of new species. I must here make acknowledgment of the kindness of Prof. E. L. Greene, without whose invaluable assistance many of the species could not have been satisfactorily determined.

Thlaspi Californicum, Watson. In fruit, Kneeland Prairie.

Viola Hallii, Gray. Same station, in very dry ground.

Arenaria macrophylla, Hook. Near the head of Redwood Creek, apparently rare.

Trifolium plumosum, Dougl. Banks of the South Fork of Trinity River, near Grouse Creek.

T. Howellii, Watson. Pilot Creek, west of South Fork Mountain. Discovered by Mr. Howell in southern Oregon during the previous year.

Hosackia decumbens, Hook. and Arn. Abundant on the eastern slope of Pilot Ridge.

Potentilla elata, Greene. The species was described from a single specimen from Napa Valley. We found two specimens near Grouse Creek.

Sedum radiatum, Watson. On rocks at Kneeland Prairie.

Ptilocalais gracililoba (Kell.), Greene. (*Calais gracililoba*, Kellogg, Proc. Cal. Acad. v. 48.) Described by Dr. Kellogg in 1873, from three specimens collected in Mendocino County, and has probably not been seen since. We found three specimens on the western side of South Fork Mountain.

Bellis perennis, L. Naturalized about Arcata.

Cnicus arvensis (L.), Hoffm. Introduced at Arcata, some six years ago, and has become firmly established.

Gaultheria Myrsinites, Hook. Near the head of Deer Creek.

Pentstemon Rattani, Gray. A small form, summit of South Fork Mountain.

Aphyllon pinetorum, Gray. Pilot Creek.

A. fasciculatum (Nutt.), Gray. A series of specimens collected between Kneeland Prairie and Mad River, almost connecting this species with *A. uniflorum.* One specimen is typical, with stem rising three inches above the ground, bearing six peduncles. Four have stems one or two inches long, bearing only two peduncles four to six inches long, lobes of corolla more spreading and brighter yellow. Four have stems barely an inch long, each bearing a single peduncle.

NEW SPECIES AND VARIETIES.

Ranunculus aquatalis, L., var. HISPIDULUS. Emersed leaves small, three-lobed, the lobes toothed, glabrous above, the lower face hispid with short, stiff bristles, which extend to the petioles and stipules. Otherwise as the var. *heterophyllus*.

In ponds at Jarnigan's, on Mad River, July 10.

LUPINUS ADSURGENS. 1 to 2 feet high, perennial, clothed with appressed silky pubescence: leaflets five to nine, as long as the petioles, cuneate-oblong, obtuse, mucronulate; stipules subulate; racemes rather short; bracts deciduous; keel naked, flowers light yellow.

Western side of South Fork Mountain, July 21.

LUPINUS SYLVESTRIS. Perennial, stem succulent, 2 to 3 feet high, erect, canescently tomentose throughout; leaves scattered, leaflets as long as the petioles, 1 to 1½ inches long, stipules slender; raceme 6 to 12 inches long, indistinctly verticillate; deciduous bracts exceeding the calyx; upper lip of calyx entire, saccate at base; keel naked, extending beyond the wings, the style becoming exserted; corolla cream color; ovules four to five.

Eastern side of South Fork Mountain near summit, July 21.

HOSACKIA DENTICULATA. Annual, 1½ to 2½ feet high, stout, erect, sparsely branched, pale green throughout; leaflets obovate, about six lines long, nearly all denticulate; the almost filiform lobes of the calyx longer than the tube; corolla pale yellow to nearly white, standard purplish; pods as long as the leaflets, nearly glabrous, three-seeded.

Along Mad River, near Jarnigan's, July 10. This plant has hitherto been included in *H. subpinnata*, Torr. and Gr., but is certainly a distinct species.

POTENTILLA LAXIFLORA. Stems decumbent or ascending, slender, a foot long, loosely branching above; leaflets ten or twelve pairs, 6 lines long, irregularly lobed or cleft, the two or three divisions narrow and acute: inflorescence loosely cymose; calyx campanulate, the triangular acute segments about equalling the tube, bracteoles slender, smaller than the segments, the whole about 3 lines broad; petals white, unguiculate, exceeding the calyx; stamens ten; filaments white, petaloid-dilated, unequal; carpels two to three, nearly 2 lines long, light brown, smooth and shining.

Hy-Am-Pum Valley, among young pines, July 25.

EPILOBIUM EXALTATUM. Root perennial, stoloniferous; stems 3 to 4 feet high, slender, terete, sparingly branched; leaves usually opposite or the floral alternate, lanceolate to ovate, acute, short-petioled, callous-denticulate, glabrous, thin and strongly veined: inflorescence open, corymbose-paniculate; calyx and capsule slightly pubescent; petals four lines long, bifid: seeds linear-oblong, smooth.

Growing rankly along brooks near Grouse Creek, August 1.

HEMIZONIA SCABRELLA. About 2 feet high, main stem zigzag with slender diverging branches, glabrous: leaves minutely scabrous; glands small, terminal, distinctly stalked: heads mostly terminal, nearly cylindrical, 4 lines high; rays three to five, three-parted, bright yellow; bracts of the receptacle five to eight, at length separable: disk-flowers variable in number, their akenes uniformly glabrous and without pappus, rarely fertile.

Hillsides near Grouse Creek, August 1. Has the habit of § Calycadenia, but with anomalous characters in the disk-akene.

SCORZONELLA ARGUTA. Leaves 6 to 12 inches long, 1 to 2 broad, entire or with few slender teeth: peduncles about 2 feet high: scales of involucre about twenty, inner lanceolate to ovate, long-acuminate, outer becoming broader and shorter; pappus white, 5 to 6 lines long, palea very thin, narrowly ovate, hardly ½ line long.

Eastern slope of Pilot Ridge, July 19.

ERIOGONUM SPECIOSUM. Suffrutescent, stems densely clustered; leaves small, broadly oblanceolate, acute at both ends, densely tomentose beneath, glabrate above; petioles 3 lines long: peduncles erect, nearly a foot high, bearing two to four elongated rays which are usually again divided, the nodes all leafy-bracted: involucres small, the acute lobes deflexed; flowers numerous, bright yellow tinged with purple, 6 lines long including the slender stipe; styles and filaments slightly hairy.

Gravelly banks of the South Fork of Trinity River, in Hy-Am-Pum Valley, July 23. Flowers very numerous and showy.

EUPHORBIA OCCIDENTALIS. Annual, diffuse, decumbent or prostrate; branches 4 to 8 inches long, glabrous, pale green or glaucescent; leaves obovate-oblong, inequilateral at base, 2 to 4 lines long, conspicuously serrulate above the middle and across the obtuse or truncate apex; stipules whitish, lacerate, ½ line long; involucres small, axillary, the glands with white or purplish margins, crenulate or minutely lobed: seeds ½ line long, ash-gray or almost white, the faces irregularly but not deeply wrinkled.

In sandy soil, Hy-Am-Pum Valley, July 23.

ALLIUM STENANTHUM. Bulb nearly spherical, the coats white, thin, transverse reticulations deeply and broadly sinuate: scape terete, 8 to 12 inches high; leaves usually two, sheathing below the ground, 1 to 2 lines wide, equalling the scape: bracts two, ovate, narrowly acuminate; pedicels twelve to twenty-five, 6 to 9 lines long; perianth segments white, ovate-lanceolate, long-acuminate, erect, scarcely spreading even in age, 5 to 6 lines long, twice as long as the stamens and style, the inner segments slightly denticulate; filaments dilated at base; ovary with conspicuous rather thin crests.

Along streams, eastern slope of Pilot Ridge, July 19.

An Enumeration of the Plants Collected by Dr. H. H. Rusby in South America, 1885-1886.—VI.

(Continued from p. 64.)

Malvastrum tricuspidatum (L.), Gray, Plantæ Wright. i. 16. Reis, 1,500 ft. (1418). Also from Unduavi.

MALVASTRUM MULTICAULE (Schlecht.) *Malva multicaulis*, Schlecht. in Lechler, Pl. Peru, No. 1784, Herb. Kew. Near La Paz, 10,000 ft. (1782).

Sida rhombifolia, L. Sp. Pl. 961. Sorata, 8,000 ft. (1452).

Sida glomerata, Cav. Diss. i. 18. Falls of Madeira (1453).

Sida cordifolia, L. l. c. 961. Mapiri, 2,500 ft. (1456); Guanai, 2,000 ft. (1457).

Sida urens, L. l. c. 963. Reis, 1,500 ft. (1454); Guanai, 2,000 ft. (1454a).

SIDA BENENSIS, spec. nova. §. Cordifoliæ. Foliis ovato-cordatis, 7-nervis, 9 cm. latis et longis, crenato-dentatis, acuminatis, utrinque scabris; petiolis 5-6 cm. longis; floribus paniculatis; paniculis foliosis, terminalibus axillaribusque; pedunculis bracteosis, gracilibus, ad maturitatem 15 mm. longis, pubescentibus; flores parvæ; calicibus pubescentibus, persistentibus; carpellis 5, biaristatis. Junction of the Rivers Beni and Madre de Dios (1455). Resembling in foliage *S. dumosa*, Sw.

Wissadula spicata (HBK.), Presl. Rel. Hænk. ii. 117. Guanai, 2,000 ft. (1862 and 1957).

Wissadula periplocifolia (L.), Griseb. Cat. Plant. Cubens 25. Yungas (1861); Guanai, 2,000 ft. (1860).

Wissadula andina, spec. nova. Frutex erectus, densissime stellato-pubescentibus; foliis petiolatis, cordatis, ovatis, acuminatis, subter pallidis, speciose stellato pubescentibus, supra velutinus; folia 2-4 cm. longa, crenulata; floribus pedicellatis, in paniculis angustis terminalis disposita, albidus, 2 cm. latis; lobis calicibus triangularibus, acuminatis; carpellis 3 vel 4, acutis. Near La Paz, 10,000 ft. (1850).

Mandon's No. 822 may perhaps be referred to the same species. In Bull. Soc. Bot. France, xii. 82, this is, however, alluded to as *Abutilon nudiflorum*, and *Sida virgata*, Cav. is given as a synonym; I am quite satisfied, however, that neither Mandon's nor Rusby's specimens can belong in that species, whatever else it may be.

Abutilon, a large-flowered species the same as Mandon's No. 821, which is alluded to in Bull. Soc. Bot. France, l. c. as *Sida cistiflora*, Cav., but can hardly be that plant. It is left for subsequent investigation. Sorata, 8,000 ft. (660).

Urena lobata, L. Sp. Pl. 974. Reis, 1,500 ft. (1460).

Pavonia Typhalea (L.), Cav. Diss. ii. 134. Mapiri, 5,000 ft. (1487).

Pavonia paniculata, Cav. l. c. iii. 135. Guanai, 2,000 ft. (1789).

Pavonia communis, St. Hil., Flor. Bras. Merid. i 224. Yungas, 6,000 ft. (1461).

Pavonia diuretica, St. Hil. Plant. Us. t. 53. Falls of Madeira, Brazil. (1459).

PAVONIA MALACOPHYLLA (*Lopimia malacophylla*, Nees & Mart, Nova Acta xi. 97; *Pavonia velutina*, St. Hil). Guanai, 2,000 ft. (1462).

Gossypium maritimum, Todaro, var. *polycarpum*, Todaro, Rel. Cult. Cot. t. viii. Tacna (659).

Bombax ? A species collected only in fruit and not matched at Kew. Yungas, 6,000 ft. (1928).

Chorisia speciosa, St. Hil. Plant. Us. t. 63. Guanai, 2,000 ft. (661).

Ochroma Lagopus, Sw. Flor. Ind. Occ. ii. 1144. Junction of the rivers Beni and Madre de Dios. (1927).

No. 1501 from Mapiri is of this order, perhaps a *Pavonia*, but is not satisfactorily determined.

STERCULIACEÆ.

Helicteres pentandra, L. Mant. 294. Guanai, 2,000 ft. (614). The same as Matthews, No. 1547 from Peru, Herb. Kew.

Helicteres brevispira, St. Hil. Flor. Bras. Merid. i. 213. Yungas, 6,000 ft. (615).

HELICTERES RUSBYI, spec. nova. § Orthocarpæa. Stamina 10? Flores horizontales, magnæ; inflorascentia sub 6-florus; calycibus stellato-tomentosus, 2 cm. longus; foliis ovato-cordatis, utrinque stellato-tomentosis, crenatibus; petiolis crassis, 2–3 cm. longis; ramis teretibus stellato-tomentosis; carpidia 5-6 cm. longæ, minutissime rufo-tomentosi. Guanai, 2,000 ft. (616). Resembling Balansa's No. 1602 from Paraguay in Herb. Kew.

Melochia hirsuta, Cav. Diss. vi. 320. Guanai, 2.000 ft. (1846).

Melochia venosa, Sw. Prodr. Flor. Ind. Occ. 97. Yungas, 4,000 ft. (1847). No. 1848 is probably the same species.

Waltheria Americana, L. Sp. Pl. 673. Guanai, 2,000 ft. (1405 and 1458).

Theobroma Cacao, L. l. c. 782. Guanai, 2,000 ft. (655).

Theobroma sylvestre, Mart., Bern. Uebers. Theobr. 14? Junction of the rivers Beni and Madre de Dios. (654).

Guazuma ulmifolia, Lam. Encycl. iii. 52. Guanai, 2,000 ft. (1859).

Guazuma tomentosa, HBK. Nov. Gen. & Pl. v. 320. Yungas, 4,000 ft. (1287).

BUETTNERIA PESCAPRÆIFOLIA, spec. nova. Glabra; rami et petioli aculeis destituti; caules ramosi; folia orbicularia vel late ovata, 8-12 cm. lata; apice obtusa vel acuta, cordata, margine integra; petioli gracili, folia æquantia; folia subter pallido-glauca, nervi prominenti, supra atroviridi, nervi immersi; capsula semiglobosa, 2 cm. diametro, densissime muricata. Flores non vidi. Guanai, 2,000 ft. (2644). Related to *B. discolor*, Benth.

BUETTNERIA BENENSIS, spec. nova. Scandens; folia herbacea, nervis utrinque prominentibus, distincte reticulata; rami et petioli pubescentes, aculeis destituti; foliis valde cordatis, ovatis, sagittatis vel ovato-lanceolatis, subter minutissime pubescentibus, supra glabris, utriusque dentato-serratis, longe acuminatis, 8-13 cm. longis, 5-7 cm. latis, petiolatis; petioli 3-4 cm. longi; inflorescentia parviflora, breviter pedunculata; flores parvi; calyce hirsuto, sepalis lanceolatis, 5 mm. longis; capsula et semina non visa. Junction of the rivers Beni and Madre de Dios. (1964). Resembles in leaf-form specimens in Herb. Kew marked *B. cordifolia*, Sagot from French Guiana, but the plant is smooth except for a few scattered, stellate hairs.

BUETTNERIA BOLIVIANA, spec. nova. Scandens; glabrescens; folia herbacea, utrinque reticulata; rami et petioli aculeis destituti; foliis cordatis, utrinque glabris, ovatis vel acuminatis, serrulatis, 6 8 cm. longis, 4-5 cm. latis, gracile petiolatis; inflorascentia parviflora?; capsula 1-5 cm. longis, 2 cm. diametro, echinata, echinis 2-3 mm. longis, semina 5 mm. longa, 2 mm. lata, glabra, nigra. Junction of the rivers Beni and Madre de Dios. (1249).

BUETTNERIA CORIACEA, spec. nova. Folia coriacea, oblonga, vel oblongo-lanceolata, 12-14 cm. longa, 4-5 cm. lata, utinque glabra, margine integra, nervi supra immersi, subter prominenti; petioli crassi, 1 cm. longi; ramis teretibus, glabris,sparse aculeatis,aculeis 2 mm. longis; inflorescetia multifloris, pedicellis et bracteis pubescentibus; calyce extus tomentoso; sepalis ovatis, acutis, 2 mm. longis. Capsula seminaque desiderantur. Junction of the rivers Beni and Madre de Dios. (2503).

Buettneria Carthaginensis, Jacq. Amer. 41. Guanai, 2,000 ft. (1250). The same as Spruce No. 3900 in Herb. Kew which is marked *B. lanceolata*, DC., to which species our specimens may perhaps best be referred.

TILIACEÆ.

Triumfetta rhomboidea, Jacq. Stirp. Amer. 147. Guanai, 2,000 ft. (714).

Triumfetta abutiloides, St. Hil. Flor. Bras. Merid. i. 223. ? Mapiri 2,500 ft. (1213).

Triumfetta althaeoides, Lam. Reis, 1,500 ft. (716) and (717 ?).

Triumfetta semitriloba, L. Mant. i. 73. Guanai, 2,000 ft. (715); Yungas, 6,000 ft. (718); Mapiri, 5,000 ft. (1236a) and 2,500 ft. (1450).

Heliocarpus Americanus, L. Sp. Pl. 448. Guanai, 2,000 ft. (1492); Beni River (1493).

Corchorus hirtus, L. l. c. Ed. 2, 747. Guanai, 2,000 ft. (1751).

Luhea uniflora, St. Hil. Fl. Bras. Merid. i. 226. Falls of Madeira, Brazil. (701).

Luhea speciosa, Willd. Neue Schrift. Gesell. Nat. Freunde, iii. 400. Yungas, 4,000 ft. (1028).

Luhea paniculata, Mart. and Zucc. Nov. Gen. i. 100. Yungas, 4,000 ft. (658).

Luhea nobilis, Planch. & Triana in Herb. Kew. Guanai, 2,000 ft. (1029).

MOLLIA BOLIVIANA, spec. nova. Folia ovata vel oblonga, subter pallida, integra, acuminata, 8-10 cm. longa, 3–4 cm. lata, utrinque lepidota; ramis teretibus, striatis, lepidotis; petiolis 1 cm. longis; capsula oblonga, exalata, densissime lepidota, 2–5 cm. longa, 1–5 cm. lata, papyracea; semina subrhomboidea, 5 mm. longa, 3 mm. lata. Mapiri, 2,500 ft. (2610). Collected only in fruit.

Muntingia Calabura, L. Sp. Pl. 509. Beni River. (1489).

Apieba Tibourba, Aubl. Pl. Guian. i. 538. Guanai, 2,000 ft. (612); Beni River (613), the latter specimen fragmentary and the determination uncertain. Falls of Madeira, with purple flowers, (611).

Apieba aspera, Aubl. l. c. 545. Mapiri, 2,500 ft. (723.)

Prockia Crucis, L. Sp. Pl. 745. Yungas, 6,000 ft. (499).

Prockia completa, Hook. Ic. Plant. i. t. 94. Guanai, 2,000 ft. (1491). Appears distinct enough from the common species.

Hasseltia laxiflora (Benth.), Eichl. in Mart. Flor. Bras. xiii. (I), 498. Falls of Madeira, Brazil. (2451).

Vallea stipularis, Mutis. in L. f. Suppl. 266. Unduavi, 8,000 ft. (465).

Sloanea obtusa (Splitg.), Schum. in Mart. Flor. Bras. Tiliaceæ, 181 ? Junction of the Rivers Beni and Madre de Dios. (1294 and 2648). I think there is little doubt of the determination, but am not altogether satisfied with it.

Tricuspidaria dependens, R. & P. Prodr. Fl. Per. t. 36. Near Valparaiso, Chili. (1025).

LINEÆ.

Erythroxylon Coca, Lam. Encycl. ii. 393. Junction of the Rivers Beni and Madre de Dios, Peruvian form, forest grown (2076); Yungas, 6,000 ft. Bolivian form (2077 and 2078); the best, cultivated (2079); wild, history unknown (2081); Mapiri, 5,000 ft. (2080).

Erythroxylon anguifugum, Mart. Abhand. Akad. Wiss. Munchen, 1840, 361. Junction of the Beni and Madre de Dios. (2075).

Erythroxylon macrophyllum, Cav. Diss. viii. 404. Mapiri, 5,000 ft. (2466.)

MALPIGHIACEÆ.*

Byrsonima crassifolia (L.), HBK. Nov. Gen. v. 149. Yungas, 4,000 ft. (504); Guanai, 2,000 ft. (505).

Byrsonima lævigata, DC. Prodr. i. 580? Mapiri, 2,500 ft. (1034). Near Spruce's No. 1648, Herb. Kew.

Byrsonima variabilis, Juss. in St. Hil. Flor. Bras. Merid. iii. 78?

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*Satisfactory determination of many of these specimens cannot be had without reference to the Jussieuian types at Paris.

Rusby's plant has yellow flowers, differing in this respect from the description. Beni River. (507).

Byrsonima, a species collected in fruit. Yungas, 4,000 ft. (2170).

Bunchosia Lindeniana, A. Juss. Monog. Malpig. 81. Guanai, 2,000 ft. (2168).

Heteropteris trichanthera, A. Juss. l. c. 180. Guanai, 2,000 ft. (514).

Heteropteris macrostachya, A. Juss. l. c. Mapiri, 2,500 ft. (2417).

Heteropteris, near *H. grandiflora*, A. Juss. l. c. 207. Guanai, 2,000 ft. (2170a).

Heteropteris anoptera, A. Juss. l. c. 205. Yungas, 6,000 ft. (730). Nos. 724, 733, 2172 and 2418 are probably of this genus but have not been determined.

Bannisterea argentea (HBK.), Spreng. in A. Juss. l. c. 139. Mapiri, 5,000 ft. (511).

Bannisteria Gardneriana, A. Juss. l. c. 167? Yungas, 6,000 ft. (1033); 4,000 ft. (852).

Bannisteria oxyclada, A. Juss. l. c. 142. Junction of the Beni and Madre de Dios. (2167).

Bannisteria Spruceana, Griseb. in Mart. Flor. Bras. Malpig. 45. Yungas, 6,000 ft. (515).

Tetrapterys papyracea, Triana & Planch. Ann. Sci. Nat. (IV.) xviii. 334. Guanai, 2,000 ft. (513 and 731).

Hiræa Jussieana, Miq. Guanai, 2,000 ft.; (528); Yungas, 6,000 ft. (732).

Hiræa Riedleyana, A. Juss. l. c. 315. Guanai, 2,000 ft. (516).

Hiræa, related to the last. Guanai, 2,000 ft. (512).

Nos. 2169 and 2171 are probably of this genus, but not determined.

ZYGOPHYLLEÆ.

Tribulus maximus, L. Sp. Pl. 553. Yungas, 6,000 ft. (739).

GERANIACEÆ.

Geranium dissectum, L. l. c. 956. Near Valparaiso, Chili. (762).

Geranium Carolinianum, L. l. c. Near La Paz, 10,000 ft. (760); Sorata, same altitude (761).

Geranium diffusum, HBK. Nov. Gen. v. 231. Sorata, 10,000 and 13,000 ft. (763 and 764).

Tropæolum Smithii, DC. Prodr. i. 684. Near La Paz, 10,000 ft. (759).

Hypseocharis pimpinellifolia, Remy Ann. Sci. Nat. (III.) viii. 238. Sorata, 8,000 ft. (2553).

Oxalis corniculata, L. l. c. 624. Near La Paz, 10,000 ft. (750 and 1020); near Valparaiso (*O. repens*). (2555).

Oxalis microcarpa, Benth. Pl. Hartw. 115. Mapiri, 2,500 ft. (747).

Oxalis Barrelieri, Jacq. Oxal. 4. Guanai, 2,000 ft. (944).

Oxalis pubescens, HBK. Nov. Gen. v. 239. Near LaPaz, 10,000 ft. (751). The same as Mandon's No. 851. Also a nearly glabrous form or variety from Yungas, 6,000 ft. (748).

OXALIS BOLIVIANA, spec. nova. Caulescens, erecta, pubescens, 30–40 cm. alta, ramosa; foliis ternatis; petiolis gracilibus, 3–5 cm. longis; foliolis sessilibus, late triangularibus, truncatis vel bilobatis, 1–1.5 cm. longis, 2–3 cm. latis; pedunculis terminalibus, elongatis, sub 10-florus; flores gracile pedicellati, 15 mm. longi; sepalis linearibus, 7 mm. longis; petalis luteis et purpureis. Yungas, 6,000 ft. (756). Evidently of the same group as the last.

Oxalis scandens, HBK. l. c. 241. Unduavi, 8,000 ft. (749); Sorata, 8,000 ft. (752).

Oxalis medicaginea, HBK. l. c. Unduavi, 8,000 ft. (755). A form or variety with small leaves the same as Mandon's No. 849.

OXALIS ANDINA, spec nova. Caulibus filiformibus, repentibus, parce pubescentibus; foliis trifoliolatis; foliolis obcordato-bilobis, 5–8 mm. longis, 6–9 mm. latis minute reticulatis; petiolis gracilibus, 3-4 cm. longis, stipulis latis, prominentibus; pedunculis petiolis valde superantibus, pubescentibus, medio 2-bracteolatis; sepalis obtusibus, 6 mm. longis; corolla purpurea, 2 cm. longa. Unduavi, 8,000 ft. (1212). Related to the last.

Oxalis, of the same section as the last but material too scanty for determination; probably undescribed. Yungas. (753).

Oxalis lobata, Sims, Bot. Mag. t. 2386. Near Valparaiso, Chili. (757).

Oxalis violacea, L. Sp. Pl. 621. Sorata, 8,000 ft. (746); also from Yungas (745 and 758), the exact localities uncertain; I cannot separate these specimens from the N. A. plant.

Oxalis dendroides, HBK. Nov. Gen. v. 250. Mapiri, 2,500 ft. (856); also from 10,000 ft. (1752).

RUTACEÆ.

Erythrochiton Brasiliensis, Nees et Mart. Nov. Act. Cur. xi. 166. Guanai, 2,000 ft. (2615).

Galipea; a species resembling in leaf form *G. pentagona* but with very different fruit. Guanai, 2,000 ft. (2072).

Esenbeckia alata (Karst. & Tri.), Tri. & Planch., Ann. Sci. Nat. (V). xiv. 306. Falls of Madeira, Brazil. (2617 and 2663).

Zanthoxylum; a species with extremely dense stellate pubescence, evidently related to *Z. stelligerum*, Turcz., but probably distinct; collected only in fruit. Guanai, 2,000 ft. (2592).

SIMARUBEÆ.

Dictyoloma Peruvianum, Planch. in Hook. Lond. Journ. Bot. v. 583. Guanai, 2,000 ft. (738).

BRUNELLIA OLIVERII, spec. nova. Arbor, 20–40 pedalis; ramulis striatis, glaucis; foliis oppositis, imparripinnatis, 25–35 cm. longis, rigidis 5-6 jugis; foliolis ovato-lanceolatis, crenato-serratibus, utrinque glabris, supra viridis, nitidis, subter pallidis, sessilibus vel breviter petiolatis; petiolis crassis, 6 cm. longis; paniculis axillaribus, tomentosis 6–8 cm. longis; flores 2 mm. lat.; calyx 4-partitus; pedicellis 2-3 mm. longis; stamina 8; fructus pubescens, 4 mm. longus; semina nigra. Unduavi, 8,000 ft. (1372). Collected also by R. Pearce about Tuapi, near Moro, 4-5,000 ft., Jan. 1866, Herb. Kew. Named in honor of Professor Daniel Oliver, who kindly determined for me this puzzling genus.

Picramnia Sellowii, Planch. in Hook. Lond. Journ. Bot. v. 578. Reis, 1,500 ft. (2690). Collected only in fruit.

Picramnia Spruceana, Engl. in Mart. Fl. Bras. xii. (2), 238. Junction of the rivers Beni and Madre de Dios. (740).

OCHNACEÆ.

Ouratea acuminata (DC.), Engl. in Mart. Fl. Bras. xii. (2), 318. (*Gomphia acuminata*, DC.) Falls of the Madeira, Brazil. (2673 and 2689).

Ouratea inundata (Spruce), Engl.. var. *erythrocalyx* (Spruce), Engl.? Falls of the Madeira, Brazil. (2645).

Ouratea, a species with elongated leaves and racemes, not matched at Kew, and probably undescribed. Junction of the Beni and Madre de Dios. (2710).

Remarks on the Group Carolinæ of the Genus Rosa, II.

By G. N. Best.

In the December number, 1887, of the BULLETIN, I suggested the advisability of dropping *Rosa lucida*, Ehrh., as a species and placing it under *Rosa humilis*, Marsh., as a variety. The reason assigned for so doing was that these roses ran into each other to such an extent that it was often impossible to separate them. In the Eastern States the former seems to be the prevailing form; in the Southern and Western the latter; in New York, New Jersey and Pennsylvania a sad mixture (to the botanist) of both is encountered.

Last winter Dr. Porter and myself forwarded to M. Crépin quite a number of specimens collected in New Jersey and Pennsylvania. These we regarded as *Rosa humilis*, and its varieties as described in the article already referred to. In our determinations the learned rhodologist concurred, observing, however, that none of our specimens, although some approached it, was what he was pleased to call the "true" *Rosa lucida*.* The points are these: this rose is a rare or rarely observed form, quite different from what is commonly recognized as such by American botanists; his knowledge of it depends largely, but not wholly, on European cultures, from which it was described by Ehrhart; he possesses two indigenous specimens, one from Boston, Mass., the other from Warrick, R. I.; all the ordinary forms hitherto ranked under *R. lucida* and *R. humilis* are but variations of the latter.

To differentiate it from *Rosa humilis*, M. Crépin insists on its sepals being entire, rarely the outer slightly lobed; leaves nine-foliolate, rarely seven-foliolate on flowering branches, the stipules long and broad with toothed margins, the bush durable and roots not surculose.

The stipules, as I think, are so prone to reflect the changes incident to growth as to be of comparatively little value as a specific indication. The sepals, the importance of which is in many respects so great in diagnosis, just so far as being entire or slightly lobed goes, possess little significance. M. Crépin in discussing the characters which separate *R. Arkansana*, Porter, from *R. blanda*, Ait., says of the sepals: "If the presence of appendices are more frequent in *R. Arkansana* than in *R. blanda*, this character it appears to me has not the importance that Dr. Watson ascribes to it, and I even think that it has no specific value at all."* The autumnal coloration is often observed in *R. Carolina* and (as I am informed) in *R. nitida*; it is occasionally seen in *R. humilis.*

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*Nouvelles Remarques sur les Roses Americaines (suite)–9 fev., 1889.

So far as the mode of vegetation goes, there are two types met with in what M. Crépin recognizes as *R. humilis;* in one the bush perishes after two or three years, its life depending in a measure on the severity of the winters, to be replaced by a new growth given off from its roots; the other under favorable conditions lives for years, the bark frequently becoming gray, new stems arising from the base of the old, forming clumps like the stems in *R. Carolina.* M. Crépin seems not aware that the latter type is the usual one in what I have called var. *lucida.*

Abundant opportunities to investigate the in-ground growth of these roses have shown me that all the forms are more or less surculose. If the stems of *R. Carolina* be rased to the ground, the following season will witness a crop, usually copious, of young shoots from every part of their predecessor's roots; the terminal portion is often transformed into an ascending axis. Here is a question of degree, not of quality. The bushes of *R. humilis* are not so hardy, so durable, more likely to be winter-killed; and, if so, stems will spring up from any part of the roots, often bearing flowers the same season, a thing seldom, if ever, observed in *R. Carolina.*

In the herbarium of the Academy of Natural Sciences, Philadelphia, I saw a specimen from Kew Gardens which corresponded very closely with the description given of the "true" *R. lucida.* The sepals entire, branches erect-ascending, stipules broad and margins toothed, leaves mostly nine-foliolate, some however seven foliolate; when the former, a forcing was noticeable, in that the lower pair was smaller and sometimes one leaflet of this pair rudimentary. Specimens collected by Mr. J. H. Redfield at Mt. Desert, Maine, when compared with the Kew specimen, made it evident, as I think, that the latter was such as the former would produce if cultivated. If guessing be allowable, I would say that the originals of the European cultures emanated from near the Atlantic coast, in rich soil, alluvial deposit, just such as is most favorable to a very vigorous growth; that to all intents and purposes they differ not from what is recognized by us as *R. lucida* (*R. humilis*, var. *lucida*).

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*Nouvelles Remarques sur les Roses Americaines–la seance du 12 Mars, 1887.

Another problem, perhaps still more difficult, is to know what are the actual relationships, between eastern forms of the *humilis* group and those of the south and west. Are they in reality but one polymorphous species, the transitional forms due to difference in location and climate—in a word—to environment? Or are they distinct species, the intermediate forms hybrids?* To the solution of this problem I bespeak the indulgent aid of all botanists, especially the Eastern, reminding them of the possibility of crossing between species and the production of fertile hybrids; and that environment modifies all forms but in all probability the most markedly those of hybridic origin.

Botanical Notes.

Corrections. There are two mistakes in the May BULLETIN. Professor Bailey's report of the blooming of *Houstonia cœrulea* on February 26th, is just a month earlier than what he intended to report, March 26th. In the enumeration of Richmond County plants *Aster cordifolius*, var. *glabratus*, should read var. *lævigatus*, under which name it was published by Professor Porter in the March issue; the other name had been used in manuscript and was inadvertently retained when Mr. Hollick made up the copy.

Pinus rigida, Mill. At South Amboy, New Jersey, a short time ago, I noticed some young shoots about sixteen inches high growing from the stump of a pine about six inches in diameter. While examining the shoots, I was interested to note that the primary leaves were about one and a quarter inches in length, and from their axils grew fascicles in some cases of four leaves, though the majority of the secondary leaves were in threes.

At Cliffwood, New Jersey, I have since found a small pine

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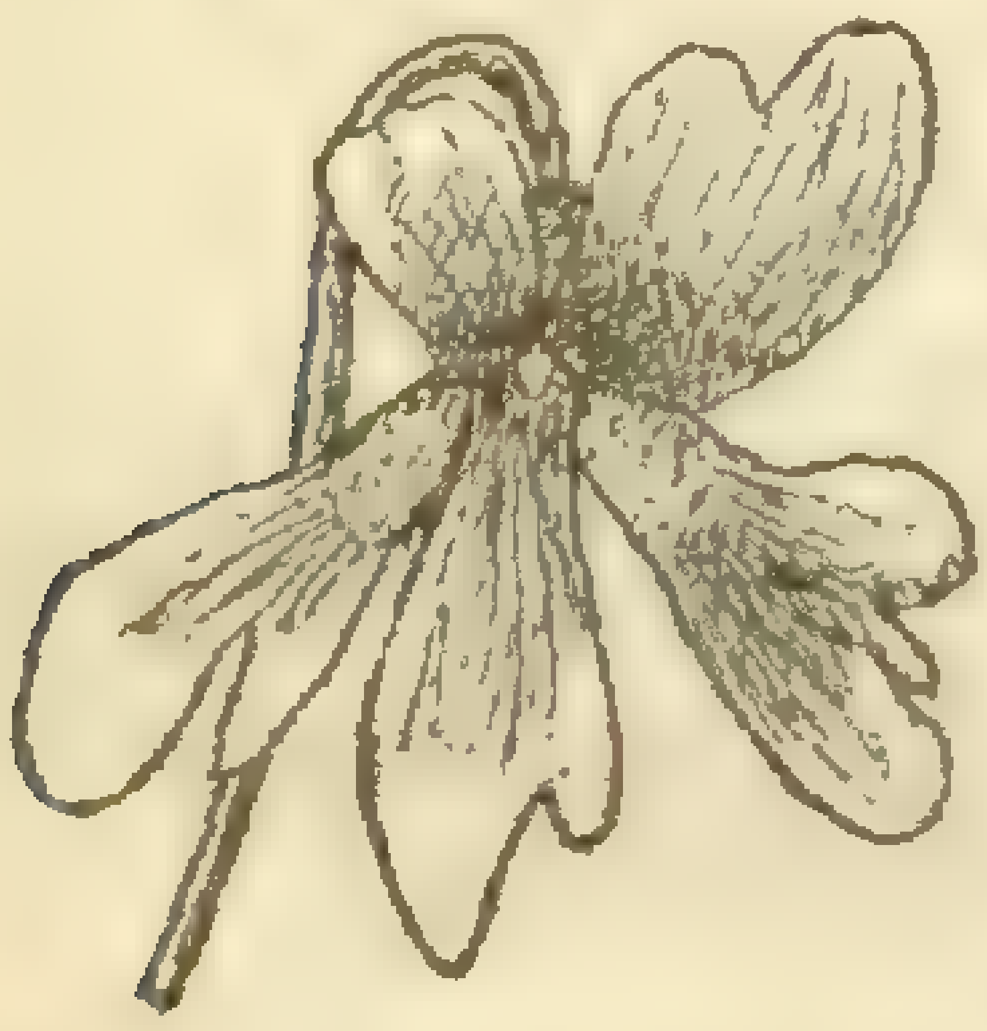
*See Journal of the Trenton Nat. Hist. Soc. No. IV., *N. A. Roses, etc.*

about three feet in height, on a branch of which I detected a fascicle of four leaves, the primary leaves being about half an inch in length. Both of the specimens mentioned above have been carefully compared with the collection of pines in the herbarium of Columbia College, and sections of the leaves have been examined under the microscope. The result of the comparison and examination leave but little doubt that the specimens referred to belong to the species of pine named above. J. I. NORTHROP.

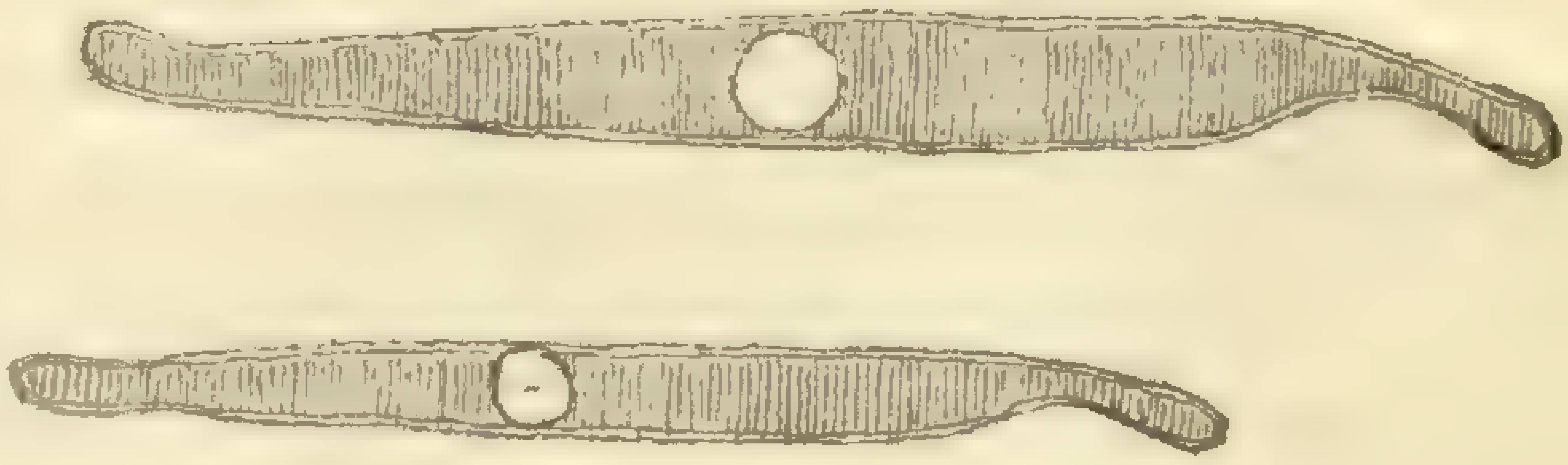
Viola palmata, L. While botanizing recently at Pelham Manor, New York, my attention was called to the great number of plants of *Viola palmata* bearing leaves that varied from reniform to those cut and divided into linear lobes. I examined the flowers and found them almost as varied in form as the leaves. In some the spurred petal was hardly noticeable, and in another two of the petals seemed to be entirely missing. In others the lateral petals were very dissimilar both in shape and in size, while in a few cases I found the petals were lobed or parted in a manner that seemed to follow no law. One of the most curious forms is shown in the cut.



At first it seemed that the tendency to variation so often shown in the leaves of *Viola palmata* had extended to its petals, but in a swamp near the locality mentioned above I found many plants of the same species in which the leaves were simply toothed, and among them a few that bore flowers with cut petals, so in this case the variations had commenced with the flower.

The only other difference I noticed between the plants with the divided leaves and those that grew in the swamp, was the greater size of the plant, and the greater length of the sepals in the flowers of the latter. J. I. NORTHROP.

Synedra pulchella, Kütz., var. abnormis, Macchiati. In the April number of the Bulletin of the Italian Botanical Society in Florence is an interesting and valuable contribution to the literature of the Diatomaceæ from the pen of Macchiati. Some algæ found in the vicinity of Sassuolo, furnished, among other diatoms, an abnormal form of *Syncedra pulchella*, which, on account of the absence of the median line, as well as the circular definite pseudonodule, which distinguish the *S. pulchella* of Kützing from all the other species of the genus, he classifies as a new variety. One end of the valve will be seen to have an extraordinary and partly constricted bent apex, while the other appears complete in its formation. The description and figure of *S. pulchella* will be found in the works of the following authorities: Van Heurck, Ralfs in Pritchard's Infus., Wm. Sm. Syn. and Kützing.



E. A. SCHULTZE.

The Journal of Mycology. Volume v, No. 1 of this publication appears as the quarterly bulletin of the section of vegetable pathology, U. S. Department of Agriculture, March, 1889, prepared under the direction of the Secretary of Agriculture by B. T. Galloway, chief of the section. It is a pamphlet of 50 pages, and is embellished by 8 plates, illustrating papers by Professors Kellerman and Swingle, Miss Knowles and Mr. Ellis. Other botanical contributions are by Professor Halsted and Mr. F. W. Anderson.

Reviews of Foreign Literature.

A Monograph of the British Uredineæ and Ustilagineæ. (8 vo., pp. 347, London, 1889).

Under the above title Mr. C. B. Plowright, F.L.S., has prepared a book of three hundred and fifty pages containing much valuable matter concerning rusts and smuts—two groups of fungi specially destructive to cultivated crops. Full descriptions of the British species of rusts and smuts are given, and an account of their life history, as far as this important point has been determined. There are chapters upon mycelium, spermagonia, æcidiospores, uredospores, teleutospores, etc. Following these are others, treating of heterœcism, spore-culture, artificial infection of plants, and two indices, one of the species and another of the host plants. The fact that members of the Uredineæ may have more than one form, living, possibly, in one form upon one host and in another upon another host, has been established for forty-seven species. The list of these determined heterœcious species begins with the wheat mildew or rust, and the cluster-cup fungus of the barberry, as demonstrated by Dr. DeBary in 1864, and closes with no less than five species demonstrated by Mr. Plowright during 1888. This is a fruitful issue of the author's untiring labor to reveal the vital association of previously isolated forms of rusts, and his methods as fully described, will be of special interest to students of the diseases of cultivated plants. The work before us is well illustrated in the text, and has seven additional page plates, chiefly upon spore germination. It gives sufficient information of a general nature to serve as an introduction to the groups treated, and while the species described are British, the volume is a valuable contribution to the literature upon rusts and smuts for all countries. The American student of these occult subjects will find in it much to aid him in his researches, besides the stimulus which always comes from the study of a new book by one who is a hard worker and full of this subject.

BYRON D. HALSTED.

Monographia Cladoniarum Universalis, Pars. i.—Edv. Wainio. (Acta Soc. Fauna et Flora Fennica, iv. 8vo, pp. 1–509. Helingsfors, 1887).

This a systematic monograph of the entire Lichen genus *Cladonia*, Hill. The synonomy and distribution are completely worked out, and there is an exhaustive citation of authors. *C. flabelliformis* (Flœrk.), Wainio, is attributed to California; *C. hypocritica* is a new species from Cape Horn, *C. flavescens* from Cape Horn, *C. hypoxanthoides*, *C. substellata*, *C. connexa*, *C. albofuscescens*, *C. mutabilis*, *C. polytypa*, *C. consimilis*, *C. Carassensis*, *C. erythrosperma*, *C. chondrotypa*, *C. rhodoleuca*, *C. sphacelata*, *C. pleurophylla*, are all new species from the Carassa Mountains, Brazil; *C. Mexicana* is also new. There are many changes in the ranking of forms, whether as species or varieties, some of which apply to American plants. There is a rigid adherence throughout the work to the maintenance of the oldest varietal or specific name and the citation of the author thereof in parenthesis, if changed in rank or genus; thus *C. Boryi*, Tuckerm. (1847) was originally *C. uncialis, var. reticulata*, Russell (1839), and is cited by the present author *C. reticulata* (Russell), Wainio.

N. L. B.

On the Plants of Kohima and Muneypore.—Charles Baron Clarke. (Journ. Linn. Soc. Vol. xxv.; 44 plates; also reprinted, pp. 107).

Mr. Clarke publishes a list of plants, with critical notes and descriptions, and illustrates many new species collected by himself on a march from Gologhat, in Central Assam, to Cachar, in October and November, 1885. 1,050 species are enumerated. An account is given of former botanical exploration in the same region and contiguous territory.

Neue Beiträge zur Moosflora von Neu-Guinea.—Von Adelbert Geheeb. (Bibliotheca Botanica, Heft 13, 1889 mit 8 Tafeln).

This contribution to the flora of New Guinea cotains some very fine illustrations of the new species, from drawings by "Adelbert and Emmy Geheeb-Belart," but the descriptions of new species are mostly from the pen of Dr. C. Müller. Of the seventeen enumerated here twelve bear his names. The plates are on the same large scale as those of the Atlas of the Bryologia Javanica and quite as good.

E. G. B.

Index to Recent American Botanical Literature.

Abies lasiocarpa and its Allies. Maxwell T. Masters. (Journ. Bot. xxvii. 129–138; 9 figures).

Dr. Masters concludes that the *Abies subalpina*, Engelm. (Amer. Nat. x. 554, 1876), the name also adopted by Professor Sargent in the 10th Census Forestry Report, is probably made up of two older species, viz.: *A. lasiocarpa* (Hook.), Nutt., and *A. bifolia*, Murray, Proc. Hort. Soc. London, iii. 318 (1863). He gives an interesting account of the history of these trees, together with descriptions based on specimens at Kew, noting also that if all the forms (including var. *fallax*, Engelm.), are reducible to one species, this must be called *A. lasiocarpa*, its earliest publication being as *Pinus lasiocarpa*, Hook. Fl. Bor.-Am ii. 163 (1840).

Acer—Nachtrage und Erganzungen zu der Monographie der Gattung. Ferd. Pax. (Engler's Bot. Jahrb. xi. 72–83).

Reference is made to *Acer Negundo*, var *latifolium*, Pax, n. var. and *A. Californicum*, var. *Texanum*, Pax, formerly referred by the same author to varietal rank in *A. Negundo.*

Adhatoda vasica. H. H. Rusby. (Reprinted from Drug. Bull., April, 1889, illustrated).

Algæ—Fourth Contribution to the knowledge of Kansas. Francis Wolle. (Bull. Washburn Coll., Lab. Nat. Hist. ii. 64).

List of twenty-three diatoms from Arlington, Reno Co., Kans.

Aristolochiaceen.—Beitrage zur vergleichende Anatomie der. H. Solereder (Engler's Bot. Jahrb. x. 421–524).

Descriptions of the histology of many American species.

Amérique Centrale.—Quelques Notes sur les Récoltes botaniques de M. H. Pittier dans. Th. Durand. (Compt. Rend. Soc. Bot. Belg. 1888, 178).

M. Pittier is in charge of a meteorological institute recently founded at San José de Costa Rica and proposes making extensive collections of the plants of that region. M. Durand gives a list of interesting additions to the flora of Costa Rica and descriptions of two new Melastomaceæ, *Conostegia Pittierii*, Cogn. and *Heterotrichium globuliflorum*, Cogn.

Botanical Nomenclature in North America. Edward L. Greene. (Pittonia, i. 276–280).

By request, Professor Greene republishes in "Pittonia," his paper on this subject which appeared in the Journal of Botany in November of last year.

Brasilien—Ueber Einige Neue Pflanzenarten aus. Th. Loesener. (Flora, lxxii. 74-79).

Trichilia gracilis, *Cathedra grandiflora*, *Tapirira fasciculata*, *Gaylussacia pruinosa*, *Leucothoe stenophylla*, *Oxypetalum Glaziovianum* and *Adenostephanus rufa* are new species, all from Glaziou's Brazilian collections.

Bromeliaceæ Lehmannianæ in Guatemala, Costa Rica, Columbia, Eucador, etc., collectæ. L. Wittmack (Engler's Bot. Jahrb. xi. 52–71).

New species are described in *Pitcairnia*, *Sodiroa*, *Caraguata*, *Guzmania*, *Tillandsia*, *Vriesea* and *Catopsis.*

Calandrinia oppositifolia. (Bot. Mag. Tab. 7051).

Catalogue of the Flowering Plants and Ferns of Kansas.—Bernard B. Smyth. (Bull. Washburn Coll. Lab. Nat. Hist. ii. 43–61).

This is undoubtedly a conscientious effort to compile as complete a local catalogue as possible, and the large number of eminent botanists who are stated to have assisted in the work certainly should give to it an air of authority. The author modestly prefaces his work with the statement that he "is only a student of botany, and, while striving to make the list as correct as possible, is conscious of many imperfections. As to nomenclature and authority, he simply adopts those names which are by common authority said to be correct ones. *He is opposed to changes of name in a plant, and prefers a name long-established and well-known, to a name, which, though more correct, is unknown.** A few exceptions are made, presumably for good cause, notably *Hicoria* for *Carya.*" ! ! Such a preface naturally leads one to expect a spirit of conservatism throughout, but we are confronted at the very beginning by the heading "Dialypetalous Exogens," as the first division of the Anthophyta, although when summing up he becomes conservative and calls the plants under this heading Polypetalous exogens. The ignoring of capitals in specific names, where their use is simply a question of good or bad grammar, is consistently carried out. Certainly, however, where the rules of grammar and "common authority" unite it seems curious that we should see *caroliniana*, *virginiana*, *parryi*, etc. Also if *Hicoria* for *Carya* why not *Castalia* for *Nymphæa?* etc. Another heading which is somewhat startling is "Petaliferous Endogens" in contradistinction to "Glumiferous Endogens." Under the former heading we find *Arisæma*, *Lilium*, etc., whose spathe and perianth are made to do duty as petals for the time being. This catalogue essays to be more than a mere list of plants, however, as it is also a price list, giving the money value of such species as the author is prepared to furnish, and from it many curious facts may be learned. Thus *Helianthus annuus* is apparently worth 25 cents, *Chenopodium album* 15 cents, *Polygonum Persicaria* 15 cents, etc., from which we conclude that they cannot be as common as with us. We are also interested to note that *Cassia Chamæcrista* is worth 25 cents, if "awake" but only 15 cents if "asleep." In all 1,602 species are catalogued, including 38 Pteridophyta. If the list could be corrected according to commonly accepted grammatical rules and a rational system of nomenclature it would be as valuable as the author designed it to be.

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*The italics are our own.

A. H.

Cereus.—A New Species of. C. R. Orcutt. (West. Am. Sci. vi. 29).

Cereus cochal is described, from Lower California, where it is known by the Indians and Mexicans under the name of "cochal."

Chara—Description of a new Fossil Species of the Genus. F. H. Knowlton. (Bot. Gaz. xiii. 156, 157; illustrated; reprinted).

Chilenische Pflanzengatterugen—Ueber einige. R. A. Philippi. (Ber. Deutsch. Bot. Gesell. vii. 115–119, t. 5).

Remarks on and descriptions of five genera formerly elsewhere described by Prof. Philippi; *Tribeles* of the Pittosporeæ, *Epipetrum* of the Dioscoreaceæ, *Lenzia* of the Amarantaceæ and *Solaria* and *Geanthus* of the Liliaceæ. Species of all are figured in the accompanying plate. All are from Chili.

College Botany, including Organography, Vegetable Histology, Vegetable Physiology and Vegetable Taxonomy, with a brief account of the succession of plants in geologic time and a glossary of botanical terms. By Prof. Edson S. Bastin. 8vo. pp. 451; 579 figures. Chicago, G. P. Engelhard & Co., 1889; price, $3.00.

This is a revised and enlarged edition of the author's "Elements of Botany" published in 1887, and reviewed at that time in these columns. The present volume has been considerably rewritten, and much additional matter included in it, and forms a valuable addition to the already numerous text books. The subject is treated by beginning with the Morphology of the flowering plants, which is discussed in considerable detail, with many practical exercises interspersed, which will serve as valuable hints to the teacher, as well as of direct advantage to the student. This is followed by the chapters on Vegetable Histology and

Physiology, in which much laboratory work is likewise suggested. We are of the opinion that a more logical undergraduate course of study can be made out by beginning with Histology. The fourth part includes the chapters devoted to Systematic Botany, and here we note some things which are decidedly in advance of Prof. Bastin's former work; the most noteworthy of these is the restoration of Algæ, Fungi and Lichens to their natural positions as classes of the sub-kingdom Thallophyta. This is rather rough on the "American School," but we feel like congratulating Prof. Bastin on his evident emancipation from his earlier ideas on this subject. He says, indeed "the attempt to arrange plants strictly in accordance with their modes of reproduction has been abandoned, both as impracticable and inconvenient;" he might very truly have added "and unnatural." His arrangement of the Bryophyta into (1) Hepaticæ, and (2) Musci, does not individualize the Sphagnaceæ as sufficiently as their greater complexity demands. The Characeæ are brought into a very unexpected, and we should argue quite erroneous position, being grouped under the sub-class Chlorophyceæ and next to the Desmids. Surely their separation as a class is demanded by their very high degree of differentiation, and it would appear that they should go at the very summit of the Thallophyte column, or the base of the Bryophyte series, rather than in the degraded company with which they are here associated. Spermaphyta is the term adopted for Phanerogamia, although the faulty construction of the word has been pointed out, and we would submit that the terminology of the groups mentioned in this sub-kingdom is rather liable to discourage the student, and is quite at variance with the author's idea to simplify science as expressed in his preface. The book is concluded with a chapter on the succession of plant life in geological time, in which the conclusions reached by Prof. Dawson in his recent "Geological History of Plants" are closely followed. N. L. B.

Colocasia in Jamaica.—Disease of. Geo. Massee. (Journ. Linn. Soc. xxiv. 45–49, illustrated).

The plantations of *Colocasia esculenta*, commonly known as "Cocoes," "Eddoes," etc., have lately been attacked by a parasite belonging to the genus *Peronospora.* This has been determined as a new species and the name *P. trichotoma* given to it by Mr. Massee. It is figured and described, as are also *Heterosporium Colocasiæ* and *Cephalosporium acremonium.* The last mentioned species flourish upon the parts of the plant already attacked by the *Peronospora.* They are frequently connected with the disease, but are not considered as in any way the cause of it.

Contributions to the Life Histories of Plants, No. IV. Thos. Meehan. (Reprinted from the Proc. Acad. Nat. Sci. Phil., March 26, 1889).

The author treats of "Secund Inflorescence," "Notes on *Pinus pungens* and its Allies"—which species is said to be scattered across the entire State of Pennsylvania along the Alleghanies—"*Corydalis flavula,* DC.," "Dimorphism in Polygoneæ," "The Nature and Office of Stipules," and "*Euonymus Japonica.*"

Cordia Greggii, var. Palmeri. (Garden and Forest, ii. 233, fig. 106).

Description of a Problematic Organism from the Devonian at the Falls of the Ohio. F. H. Knowlton. (Am. Journ. Sci., xxxvii. 202-209, illustrated, reprinted).

The organism is provisionally named *Calcisphæra Lemoni,* and it is an open question whether the animal or vegetable kingdom will ultimately claim it. It closely resembles the fruit of *Chara.*

Desert in June.—The. (West Am. Sci. vi. 21–26).

Contains lists of plants from several localities in the Colorado Desert.

Desmids: Their Life History and Their Classification.—II. Fred'k. B. Carter. (Am. Month. Mic. Journ. x. 73–79).

Diatoms and Oscillaria—Motions of certain. Wm. A. Terry. (Am. Month. Mic. Journ. x. 81–83).

Diatoms of Mobile, Alabama.—K. M. Cunningham. (The Microscope, ix. 105–108).

Contains a list of 137 species and varieties.

Flora of Custer County, Colorado.—Notes on the.—III. T. D. A. Cockerell. (West Am. Sci. vi. 10–12).

Food of Plants—The. D. P. Penhallow. (Can. Rec. Sci. iii. 333–353).

Fossil Plants collected by Mr. I. C. Russell at Black Creek, near Gadsden, Ala., with Descriptions of several new Species—List of. Leo Lesquereux. (Proc. U. S. Nat. Mus., xi. 83-87, Pl. XXIX).

Rhabdocarpus Russellii and *Stigmaria Russellii* are described and figured as new species. From the same locality are also figured *Neuropteris Elrodi*, *N. Smithii*, *Sphenopteris Harveyi* and var. *robusta*, all of Lesquereux.

Fossil Wood and Lignites of the Potomac Formation—The. F. H. Knowlton. (Am. Geol. iii. 99–106, reprinted. Also reprinted in abstract from Proc. Am. Assn. Adv. Sci., xxxvii).

Araucarioxylon Virginianum is described as a new species.

Fungi of Montana.—Brief Notes on a Few Common. W. F. Anderson. (Journ. Mycol. v. 30–32.)

Grasses of Central Kansas.—A Contribution to the Knowledge of. Joseph Henry. (Bull. Washburn Coll. Lab. Nat. Hist. ii. 61–63).

A list of eighty-four species, including four undetermined. A number are stated to have been first recorded as Kansas grasses through the author's collection.

Hepatica triloba.—First Appearance of. D. D. Slade. (Garden & Forest, ii. 226, 227).

Memoranda upon the earliest dates of flowering of this plant each year, at Newton, Mass., from March 2, 1880, to March 17, 1889.

Hymenomycetous Fungi.—Some new Species of. J. B. Ellis and B. M. Everhart. (Journ. Mycol. v. 24–29, Pl. VIII.)

Inocybe pallidipes, *I. murino-lilacinus*, *I. cicatricatus*, *I. echinocarpus*, *I. subdecurrens*, *I. tomentosus*, *Agaricus olivæsporus* are described as new. A new genus, *Mucronoporus*, is also erected from certain species of *Polyporus* having spiny spores. *M. tomentosus* is figured.

Kansas Fungi.—New Species of. W. A. Kellerman and W. T. Swingle. (Journ. Mycol. v. 11–14, Pl. I).

Tilletia Buchloëana, on male plants of *Buchloë dactyloides*; *Ustilago Andropogonis*, on *Andropogon Hallii* and *A. provincialis*; *Ustilago Bouteloueæ*, on *Bouteloua oligostachya*, and *Æcidium Daleæ*, on *Dalea laxiflora* are described, and the first three figured.

Liquidambar.—The. C. S. S. (Gard. and For. ii. 232, 233 ; illus.)

Macleania punctata. (Gard. Chron. v. 531, illustrated.)

Mutisia Clematis. (Gard. Chron. v. 500, Fig. 88).

Myrmecophilism. Wm. Trelease. (Psyche, 1889, 171–180).

The relations existing between ants and numerous vegetable species has received much attention of late in the studies of several biologists, notably of the younger Schimper and Delpino. Taking this topic as the text of an address as the retiring president of the Cambridge Entomological Club, Professor Trelease remarks on the present state of knowledge of the very interesting subject, and the views and hypotheses of the several observers.

Nummularia and *Hypoxylon.—Synopsis of North American Species of.* J. B. Ellis and B. M. Everhart. (Journ. Mycol. v. 19-23.)

One new species (*Nummularia subapiculata*) is described.

Nyctaginaceen—Neue Arten von. Anton Heimerl. (Engler's Bot. Jahrb. xi. 84–91).

The new species are *Mirabilis Watsoniana* named for Dr. Sereno Watson, and based on Benonilli's No. 2616 from Guatemala ; *Boerhaavia gracilima* from Mexico, based on Hartweg's No. 45 and Pringle's No. 665 of 1885 from Chihuahua, distributed as *B. paniculata ; Abronia pogonantha*, based on Parish No. 1345 from the Mojave River, Southern California, collected in 1882 and distributed as *A. turbinata*, Torrey ; *Bougainvillea brachycarpa* from Brazil and *Neea Wilsneri* from Venezuela and Colombia.

Opuntia polyacantha. (Bot. Mag. Tab. 7046.)

Outlines of Lessons in Botany, I. Jane H. Newell. (Ginn and Co., Boston, 1889, pp. 140).

Miss Newell's attractive little volume in its completed form more than fulfils the promise of its first chapters, which were issued separately as pamphlets. The plan is not only perfectly practicable and the method of treatment suggestive, but it is also calculated to lead to a knowledge of more complex processes through a series of simple experiments which any child could perform. The illustrations also are excellent and attractive, evidently studied from nature, recording stages of common things in a way to make both teacher and pupil wish to see for themselves. A second volume leading up through the inflorescence to systematic work is promised.

Palmoxylon—Description of two Species of—One New—From Louisiana. F. H. Knowlton. (Proc. U. S. Nat. Mus. xi. 89–91, Pl. XXX.)

Palmoxylon cellulosum, n.sp., is figured in section and described in regard to the constitution and appearance of its tissue. On the same plate is also figured a section of *P. Quenstedti*, Felix. Both species were collected by Mr. Lewis C. Johnson in Rapides Parish, La.

Passiflora Hahnii. (Bot. Mag. Tab. 7052.)

Peronosporeæ and Rain-fall. Byron D. Halstead. (Journ. Mycol. v. 6-11).

Portlandia pterosperma. (Gard. and For. ii. 208, 209, Fig. 105.)

Raphidodiscus.—The Affinities of. C. M. Vorce. (The Microscope, ix. 132–137, Pl. VI).

Remizia pedunculata. (Garden, xxxv. 343, illustrated).

Rusby, Henry H. (Pharm. Rec. ix. 147, with portrait.)

Salpichroma rhomboideum. Garden, xxxv. 367, illustrated.)

Scleroderma in Saccardo's Sylloge.—The Genus. J. B Ellis. (Journ. Mycol. v. 23, 24).

Shepherdia Canadensis.—Notes on. D. P. Penhallow. (Can. Rec. Sci. iii. 360–363).

An interesting account of the methods used to make edible preparations from the berries.

Shortia.—The Home of. Frank E. Boynton. (Garden and Forest, ii. 214, 215).

An interesting account of a trip to the Jocasse Valley, N. C., where the plant is described as growing "by the acre." It is indeed a subject for congratulation that it may be found there in such abundance that there is but little danger of its being exterminated by botanical collectors, but it is to be sincerely hoped that no person will again be enabled to convert this plant into an article of merchandise.

Shortia galacifolia. (Garden, xxxv. 330).

A further memorandum of this plant states that the specimens exhibited in England some months since by Mr. Elwes were obtained from a new locality in America. "Its whereabouts, however, is kept secret, and unless some of our traveling nurserymen happen to drop across it, we need not fear its extermination for some time." We greatly regret that some American nurserymen have already "dropped across it."

Species, New or Noteworthy, IV. Edward L. Greene (Pittonia, i. 280–287).

Unifolium lilacinum : Urtica Californica ; Hesperochiron ciliatus ; Pentstemon arenarius ; Mimulus glareosus ; Navaretia leptantha ; Seriocarpus tomentellus ; Bæria consanguinea. Helianthus (?) *invenustus Delphinium pauperculum ; D. recurvatum ; D. apiculatum ; Cotyledon linearis ;* and *Saxifraga Californica*, which is the *S. Virginiensis* of the Botany of California here separated from the eastern plant of that name.

Taxodium.—Histology of the Leaf of. Stanley Coulter. (Bot. Gaz. xiv. 76–81, 101–107, Pl. XI).

Thalictrum anemonoides, (Garden, xxxv. 409, Pl. 699).

Triblidium rufulum. J. B. Ellis. (Journ. Mycol. v. 29, 30.)

Umbelliferæ.—Concerning some Californian. Edward L. Greene. (Pittonia, i. 269–276).

Notes on *Sanicula Menziesii* and *S. maritima*, the latter reported as very rare ; *Scandix Pecten-veneris* which is naturalized in Napa Valley ; *Cicuta virosa*, *C. maculata* and *C. Californica* are maintained as species, contrary to the recent views of Prof. Coulter, and *Atænia*. Hook & Arn. is shown to have priority over *Edosmia*, Nutt., the four described species standing *A. Gairdneri*, Hook & Arn.; *A. Kelloggii* (Gray), Greene ; *A. Oregana* (Nutt.), Greene, and *A. Howellii* (Coult. and Rose), Greene. Prof. Greene also criticizes some of the bibliographical details of the "Revision of N. A. Umbelliferæ," noting that M. Baillon had long ago restored *Zizia*, Koch, to generic rank, and that Haller named the order Umbelliferæ in 1753, thirty-six years before Jussieu used the term.

Uromyces.—An Interesting. Byron D. Halsted. (Journ. Mycol. v. 11).

A description of a new species (*U. perigynius*) found on *Carex intumescens.*

Utsilago Zeæ Mays.—A Study of the abnormal Structures induced by. Etta L. Knowles. (Journ. Mycol. v. 14–18, Plates II, III, IV, V, VI, VII.)

West American Oaks. Edward L. Greene. (Pamph.; 4 to.; pp. 46; twenty-four plates; San Francisco, May, 1889.)

The late Dr. Albert Kellogg left many papers and drawings, representing his studies of West American botany. Among these were a number of drawings of oaks—-almost all in fact which are known in California and adjoining territory at the present time. Dr. Kellogg died without completing the descriptions which were to accompany them, but his friends W. G. W. Harford, W. P. Gibbons and Justin P. Moore determined that his labors should not be lost to science. They secured the coöperation of Prof. Geo. Davidson, in response to whose appeal Prof. Edward L. Greene agreed to write the text and Mr. James M. MacDonald undertook to bear the entire expense of publication. The result is the splendid monograph before us, which is not only a credit to all concerned in its issue, but is a lasting monument to the memory and labors of Dr. Kellogg. The plates are perfect, both in design and execution, leaving nothing further to be desired from them. The monograph is preceded by the correspondence with Mr. MacDonald, a sketch of Dr. Kellogg's life and works by Prof. Davidson, and an introduction to the subject by Prof. Greene. In addition to the eighteen species and varieties figured by Dr. Kellogg, the text contains descriptions of two new species, *Q. MacDonaldi* and *Q. turbinella.* One new variety, *Q. dumosa*, Nutt., var. *munita*, is figured and described, and another, *Q. Engelmanni*, Greene, var. *elegantula*, is briefly mentioned. *Q. Engelmanni* is a new species, which was drawn by Dr. Kellogg under the impression that it was a form of *Q. oblongifolia*, Torr. A list of six others occurring in the region, but not figured, is appended for the purpose of making the work as complete as possible. In his arrangement of the species Prof. Greene has adopted the unconventional system of placing the Black Oak group first, for the reason, as he frankly intimates, that this allows him to begin the work with *Q. Kelloggi*, Newb., followed next by *Q. Morehus*, Kellogg. Having thus adopted the unconventional Prof. Greene feels free to place the problematic *Q. densiflora*, Hook. & Arn. at the end, in regard to which he says: "*Quercus densiflora* is, indeed, almost as much a Chestnut as it is an Oak; but, as an Oak, it is obviously of that group in which it is here placed, other than a Black Oak." Each of the figured species is accompanied by a complete bibliography, description, account of habitat, and interesting general remarks. An interesting point to note is the fact that although none of the specific names ante-date the year 1801, and most of them were given for the first time since 1849, yet the synonymy of several is already quite lengthy and requires not a little care to unravel successfully and avoid confusion. Prof. Greene has faithfully adhered to the law of priority in nomenclature, and several changes are to be noted from commonly accepted names. *Q. Morehus*, Kellogg, is separated from the evergreen species *Q. Wislizeni*, A.DC., with which it was confused in Dr. Watson's Botany of California. Under this latter species Prof. Greene says: "I am now constrained to refer to the present species a diminutive bush oak, indigenous to the higher parts of Santa Cruz Island, which shortly after its discovery I published as new, under the name *Q. parvula*. * * *" *Q. Breweri*, Engelm., (1880), becomes *Q. Œrstediana*, R. Br. Campst., (1871). *Q. Gambelli*, Nutt., is restored to specific rank. *Q. oblongifolia*, Torr., is referred to *Q. undulata*, Torr., var. *grisea* (Liebm.), Engelm., and *Q. oblongifolia*, Engelm., becomes *Q. Engelmanni*, Greene. These are but a few of the many points of interest which may be gleaned from a careful study of the work. It will also be noticed that Prof. Greene has allowed the unconventional to influence his nomenclature in several instances, as in the case of *Quercus dumosa munita*, Greene, which is certainly euphonious, but which, it seems to us, would appear more in keeping with the character of the work if written *Q. dumosa*, Nutt., var. *munita*, Greene. The book will always be not only a pleasure to look at from an artistic standpoint, but also one of invaluable reference for the student, even after other new species shall have been added from the region.

A. H.

Proceedings of the Club.

The regular monthly meeting was held Tuesday evening, May 14, 1889, the President in the chair and twenty-five persons present.

Mrs. H. L. Smith was elected an Active Member.

Mr. Hogg exhibited a bright pink-bracted form of the common dogwood, *Cornus florida*, from a graft on the ordinary form grown at Flushing, L. I., the original stock coming from Weldon, North Carolina. The beautiful plant was much admired.

Miss Steele showed albino flowers of *Polygala paucifolia*, from Concord, N. H.

Dr. Northrop showed specimens of *Viola palmata* from Pelham Manor, with lobed petals, specimens of *Pinus rigida* from Cliffwood, N. J., having the primary leaves 1¼ inches long, and some of the secondary leaves in fours, and called attention to the 4-ranked arrangement of the prickles on the stem of *Smilax rotundifolia*.

Dr. Rusby then delivered the announced paper of the evening on "The Melastomaceæ." He illustrated his remarks for the most part by the very numerous specimens collected by himself in Bolivia and Brazil, including some twenty-six undescribed species. He remarked on the exceedingly ornamental appearance of the trees and shrubs, on the use of various species as dye-plants, the name of the order and the original genus *Melastoma* being derived from the fact that the seeds of that genus stain the mouth black when chewed. The great profusion and beauty of their flowers have gained for them the name "Rhododendrons of the Andes."

The adjourned meeting was held Wednesday evening, May 29, the President in the chair and fifty-one persons present.

Professor Wm. R. Dudley, of Cornell University, addressed the Club on "The Marine Laboratory at Naples and its Influence on Theories of Scientific Work." The lecture was illustrated with lantern views, and was heard with great interest and profit, and at its close a vote of thanks was extended to the speaker for the pleasure the members had received.

The chairman of the Field Committee announced that no excursions would be arranged during either July or August, as the experience of the past two seasons had shown that almost all the members were away from the city during those months, but that they would be resumed in September.

Dr. Rusby exhibited specimens of the fruits of a species of

Lecythis and of *Bertholetia excelsa.* The latter furnishes the ordinary Brazil nuts of commerce, while the former furnishes a nut known in Brazil as Sapucaya, but which is rarely collected in quantity sufficient for export. He called attention to the different methods by which the seeds escaped from these two woody cases. In *Lecythis* the hypanthium is furnished with an operculum which composes one-fourth of the structure, and which falls off with the falling of the fruit, thus allowing the seeds to escape. In *Bertholetia* the operculum is minute and the seeds apparently remain within the case until this is ruptured by their swelling on absorbing water.

Mr. Lighthipe showed a single specimen of *Hyoscyamus niger*, found near the railroad at Woodbridge, N. J. The plant is but rarely found within the one hundred mile circle.

Dr. Newberry called the attention of the Club to an interesting case of the failure of insect fertilization of a plant and the subsequent failure of fruit production that had recently come to his attention. It appears that on the Dry Tortugas there are almost no insects, and while the pumpkin vines grew thriftily, no pumpkins could be produced until the plan of dusting the pistillate flowers with pollen was put into operation and an abundant supply obtained. Dr. Newberry remarked also upon the recent elaborate monograph of West American Oaks, by Professor E. L. Greene, illustrated by the drawings of the late Dr. Albert Kellogg, and exhibited a copy of the work. It is reviewed at length on another page.

Dr. Britton reported his recent observation on the fertilization of *Smilax rotundifolia* by small bees which were observed busily visiting the staminate flowers in bright sunshine about midday at Prince's Bay, Staten Island, during the Field Excursion of May 25th. The insects were watched by several members of the Club.

The Secretary announced that copies of the new List of Members, Constitution and By-Laws had been mailed to every member of the Club.

The editor announced the completion and distribution of Vol. I. No. 1 of the "Memoirs."

BULLETIN

OF THE

TORREY BOTANICAL CLUB.

Vol. XVI.] New York, July 6, 1889. [No. 7.

The Fresh-water Algæ of Maine.– II *

By F. L. Harvey.

Observations were continued the past season upon the Fresh-water Algæ of Maine, and below are given the species identified during the summer and fall of 1888, which were not mentioned in the BULLETIN for June of that year.

The species recorded for 1887 were from gatherings near Orono, but the past season we have had material from Augusta and Moosehead Lake, collected by Dr. A. G. Young of the State Board of Health, and from Guagus Stream, forty miles north east from Orono, collected by the writer, besides some rich gatherings from near home.

Quite a number of genera not found last year were discovered, but the interesting find of the season is a new species of *Nodularia* in fresh water.

We notice in the BULLETIN, Dec., 1888, p. 224, that Wm. West has published in Jour. Bot. xxvi. 339-340, a list of Maine Algæ found in a gathering sent him from Orono, Me., by my associate, Prof. Aubert. We have not seen this contribution, but having examined a part of the gathering made by Mr. L. H. Merrill which was sent abroad, and as our notes were made months before Mr. West's article appeared, we publish independently, feeling sure that in such an uncertain quantity as microscopic material some different species must have been observed.

The locality from which Mr. West's material came was exceedingly rich in desmids and was a swampy place in a pasture, a part of the outlet of a Tamarack swamp flooded in the spring but dry in the late summer and fall. We have designated the locality as "Swamp east of the College Woods," and from it we examined material taken in June and August. References to plates and pages are to Wolle's "Fresh-water Algæ and Desmids of the U. S." In arranging the species we have followed the above work. Again we are greatly obliged to Mr. Wolle for advice and assistance.

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*Continued from Vol. XV, p. 161 (June, 1888)

CLASS I.—RHODOPHYCEÆ.

Family III.—Batrachospermaceæ.

69. *Batrachospermum vagum*, Ag. p. 57, Pl. LXV.—This species is widely distributed in Maine. Collected in Guagus Stream 40 miles northeast from Orono, also received from Dr. Young from near Augusta. Our specimens were typical, bluish-green but communicated a violet color to the water in which they stood.

CLASS II.—CHLOROPHYCEÆ.

Family VI.—Œdogoniaceæ.

70. *Œdogonium cryptoporum*, Wittr., p. 70, Pl. LXXIV.—Small form, scarce. In a gathering from Pushaw Stream. July.

71. *Œ. Borisianum* (LeCl.), Wittr., p. 81, Pl. LXXVIII.—Finely in fruit. Pool by the roadside east of Oldtown on the road to Sunk Haze Stream. Aug.

72. *Œ. Landsboroughi* (Hass.), Wittr. p. 91, Pl. LXXXI.—We sent Mr. Wolle some of the gathering and he made the following remarks regarding this species: "A beautiful specimen. The typical plant. Better than the one figured by me. Male plant frequent with 5 to 25 cells. The spores more ellipsoid than obovate yet characteristic. Very good."

Associated with the above species and with *Spirogyra calospora* and *S. bellis*, all finely in fruit. Aug.

Family VIII.—Confervaceæ.

73. *Conferva bombycina*, Ag., p. 142, Pl. CXXI.—Pushaw Stream. Aug. Common.

74. *Rhizoclonium fontinali*, Kg., p. 144, Pl. CXXI.—In one specimen the small processes were very scarce, and the plant grew in the still, deep water of Pushaw Stream. Aug.

75. *R. fluitans*, Kg. p. 145, Pl. CXXI.—In swift water at the outlet of a mill-flume. Attached to the rocks and sometimes the filaments were over a foot long. Orono. Aug.

Family X.—Vaucheriaceæ.

76. *Vaucheria Dillwynii*, Ag. p. 150, Pl. CXXVI.—This form was found in pools on the bank of the Penobscot, but being sterile could not be positively determined. Orono. Aug.

77. *V. sessilis* (Vauch.), DC., p. 151, Pl. CXXVII.—Pushaw Stream. Aug. Well in fruit. In still water.

Family XIII.—Protococcaceæ.

78. *Pediastrum Boryanum* (Turpin), Menegh. Desmids U. S. p. 153, Pl. LIII. Bond Brook, Augusta. Dr. Young. Cœnobiums in our specimens 16 to 32-celled.

79. *P. pertusum*, Kg. p. 154, Pl. LIII.—The type form from Augusta (Dr. Young) July. Also another form with lobes a little shorter than Wolle's Fig. 34. A careful count of the cells of one specimen gave 15, or the plan of five instead of four. Pool back of college woods. Aug.

80. *P. pertusum*, var. *braclylobum*, A. Br. p. 154, Pl. LIII.—Associated with the above in pool back of college woods, Orono. Aug.

81. *P. Ehrenbergii* (Corda), A. Br. p. 154, Pl. LIII.—Pool back of college woods. Aug. Diameter of our specimens 10μ 4 celled.

82. *Scenedesmus caudatus*, var. *typicus*, Kirch. p. 172, Pl. CLVI.—Bond Brook near Augusta (Dr. Young) Aug.

83. *S. caudatus*, var. *abundans*, Kirch. p. 172, Pl. CLVI.—Associated with the above.

84. *S. dimorphus*, Kg. p. 173. Pl. CLVI.—Associated with above.

85. *Polyedrum enorme* (Ralfs), Rab. p. 184, Pl. CLIX.—Small forms 12 to 25 μ. Associated with *Staurospermum viride*, Guagus Stream. July.

Family XIV.—Palmellaceæ.

86. *Dictyosphærium Ehrenbergianum*, Naeg. p. 186, Pl. CLVI.—Several families observed had single cells at the ends of

the filaments, while others had the cells arranged in groups of four. Intermediate forms showing constrictions in the single cells were noticed, indicating process of division. Quite common in a gathering from Bond Brook, Augusta. Dr. Young.

87. *Tetraspora lubrica*, var. *lacunosa*, Chaud. p. 191, Pl. CLXV.—Sunk Haze Stream ten miles east of Oldtown. Attached to logs and stones in running water. Thallus sometimes nearly a foot long and light-green. July and Aug. Common.

88. *Porphyridium cruentum*, Næg. p. 194, Pl. CLXVI.—On brick floor in the cellar of Coburn Hall, State College, Orono. Oct.

89. *Rhaphidium polymorphum*, var. *falcatum* (Corda), Rab. p. 198, Pl. CLX.—Augusta, July. (Dr. Young.)

90. *R. convolutum* (Corda), Rab. p. 198, Pl. CLX.—Our specimens occurred in spherical masses composed of 50 cells or more. Bond Brook, Augusta. Dr. Young.

Family XVI.—Conjugatæ.

91. *Spirogyra calospora*, Cleve, p. 209, Pl. CXXXIII.—Pool by roadside east of Oldtown toward Sunk Haze Stream. Associated with the following and species of *Œdogonium* mentioned above. Well fruited but not abundant. Aug.

92. *S. bellis* (Hass.), Cleve, p. 217, Pl. CXXXVII.—Associated with above. Abundant and finely fruited. *Pandorina morum* and several desmids occurred in the same pool, dug to get water for horses.

93. *Pleurocarpus mirabilis*, A. Br., p. 232, Pl. CXLIX.—The sterile form of this species is common, but its occurrence in fruit is rare. The finding of a large mass of it finely in fruit is interesting. Mr. Wolle knew the form eight years before fruit was observed and had not seen fruit-specimens since 1883, until we sent them last summer. Mouth of a spring brook, tributary of Guagus Stream, 40 miles northeast from Orono. July. The plant grew in the still stream where the cold spring water emptied. There was a mass of it, nearly ten feet each way.

94. *Staurospermum viride*, Kg. p. 234, Pl. CL.—Guagus Stream. July. Abundant.

Family XVII.—Desmidieæ.

95. *Bambusina Brebissonii*, Kg., p. 24, Pl. I.—Swamp by roadside west of Orono toward Pushaw Pond. Aug. Abundant.

Desmidium Swartzii, Ag. p. 26, Pl. II.—Mentioned before (No. 17) from sterile forms only. Found this season finely in fruit, as shown on Pl. II, fig. 3. Associated with the above. Aug. Abundant.

96. *Sphærozosma filiforme*, Rab., p. 29. Pl. IV.—Swamp back of college woods. Aug. Our plant differed in minor points from the description but not enough to separate it. In chains of cells 2 to 8. 15 to 20 μ diameter.

97. *S. vertebratum* (Breb.), Ralfs, p. 30, Pl. IV.—Associated with the above. Aug.

98. *Spirotænia condensata*, Breb., p. 33, Pl. III.—Swamp back of college woods. July and Aug.

99. *Penium margaritaceum*, Breb., p. 34, Pl. V.—Swamp back of college woods. Aug.

100. *Closterium Juncidum*, Ralfs., p. 38, Pl. VI.—Swamp back of college woods. Aug.

101. *C. macilentum*, Breb., p 38, Pl. VI.—Pool by roadside east of Oldtown. Aug. Our plants measured 375 × 10 μ and were transversely one-striate.

102. *C. acerosum* (Schrank), Ehrb., p. 41, Pl. VI.—Swamp back of college woods. Aug. 60 × 600 μ.

103. *C. strigosum*, Ehrb., p. 42. Pl. VI.—With the above. Aug.

104. *C. Dianæ*, Ehrb., p. 44, Pl. VII.—With the above. Aug.

105. *C. parvulum*, Næg.,p. 45, Pls. VII and VIII.—With the above. Aug.

106. *Docidium crenulatum* (Ehrb.), Rab. p. 47, Pl. IX.—Augusta. July. Dip by Dr. Young. 48 × 544 μ.

107. *D. truncatum*, Breb., p. 48, Pl. IX.—Swamp back of college woods. Aug.

108. *D. nodosum*, Bail., p. 50, Pl. XI.—With the above. Aug.

109. *Calocylindrus connatus*, var. *minus*, Nord., p. 55, Pl. XII. Spring brook in Orono. Aug. Common.

110. *Cosmarium ovale*, Ralfs., p. 57, Pl. XIII.—Swamp back of college woods. Aug. Very abundant. 116×203 μ, some longer than recorded.

111. *C. tinctum*, Ralfs, p. 61, Pl. XVI.—With above. 10×18 μ. Common. Aug.

112. *C. nitidulum*, De Not., p. 62, Pl. XVIII.—Moosehead Lake. July. Gathering by Dr. Young.

113. *C. læve*, Rab., p. 62, Pl. XV.—Form and size of this species but the cytioplasm differently arranged. 15×12 μ. Moosehead Lake. Dr. Young. July.

114. *C. undulatum*, var. *crenulatum*, Wolle, p. 67, Pl. XVI.—Guagus Stream. July. Augusta. Dr. Young.

115. *C. triplicatum*, Wolle, p. 73, Pl. XIX.—Swamp back of college woods. Our form is not typical, but too near to separate.

116. *C. conspersum*, Ralfs, p. 75, Pl. XIV.—Spring brook, Orono. Our specimens are exactly like Wolle's fig. in form, but only 32 μ diam. Further study may prove it to be a new species.

117. *C. Portianum*, Archer, p. 77, Pl. XIV.—Swamp back of college woods. Aug.

118. *C. ornatum*, Ralfs, p. 82, Pls. XVIII and XLIX.—With the above. Also from Moosehead Lake. Dr. Young. Diameter 32 μ.

119. *C. subcrenatum*, Hantzsch., p. 84, Pl. XVIII.—Swamp back of college woods. July.

120. *C. biretum*, Breb., p. 86, Pl. XVII.—Pool by road toward Pushaw Pond. June. Small form, only 37 μ diam.

C. Broomii, Thwaites, p. 86, Pl. XVII.—Recorded before (No. 40), but the forms observed this season were small, only 20×27 μ, with the sinus more open and the neck longer than Wolle's fig. Frog pond, Orono. July.

121. *C pseudopectinoides*, Wolle, p. 89, Pl. XIX.—Form of this species but only 23 μ diameter. Moosehead Lake. Dr. Young. July.

122. *Xanthidium cristatum*, var. TRUNCATUM, n. var. Half cells nearly hemispherical, broadest at the ends. Ends truncate and bearing the four pairs of spines. Sinus more open. Differs from Delponte's variety of *X. cristatum* figured in "Desmidicearum Subalpinarum" by being broadest at the ends and

truncate. Associated with the type form but less common. Swamp back of college woods. July.

123. *X. asteptum*, Nord., p. 93, Pl. XXI.—Form somewhat broader than Wolle's figure but shape and arrangement of spines the same. Swamp back of college woods. Aug.

124. *X. fasciculatum*, var. *subalpinum*, Wolle, F. W. A., p. 34. Pl. LVI.—With the above. Aug.

125. *X. antilopæum*, var. *polymazum*, Nord. p. 94, Pl. XXIII. With the above. July.

126. *Arthrodesmus subulatus*, Kg. p. 96, Pl. XXIV.—Swamp back of college woods. July.

127. *A. incus*, var. *depressa*, Wolle, p. 97, Pl .XXIV.—Frog pond, Orono. July. Form only 9 μ diameter.

128. *A. octicornis*, Ehrb., p. 97, Pl. XXIV.—Bond Brook, Augusta. Collected by Dr. Young. July.

129. *Euastrum oblongum* (Grev.), Ralfs, p. 98, Pl. XXV.—Pool by roadside west of Orono. June. Also swamp back of college woods. Aug.

130. *E. pinnatum*, Ralfs, p. 98, Pl. XXVIII.—Swamp back of college woods. Aug.

131. *E. humerosum*, Ralfs, p. 99, Pl. XXXIII.—Pool by roadside west of Orono. June.

132. *E. ansatum* (Ehrb.), Ralfs, p. 99, Pl. XXIX.—Swamp back of college woods. Aug.

133. *E. didelta* (Turp.), Ralfs, p. 99, Pl. XXIX.—Moosehead Lake in gathering by Dr. Young. July.

134. *E. urnaforme*, Wolle, p. 100, Pl. LII.-Moosehead Lake (Dr. Young).

135. *E. rostratum*, Ralfs, p. 106, Pl. XXVII.—Roadside pool west of Orono. June.

136. *Micrasterias truncata* (Corda), Ralfs, p. 114, Pl. XXXVIII.—Swamp back of college woods and pool west of Orono. Our specimens were 100 μ diameter and had the ends well rounded. Common. Aug.

137. *M. Jenneri*, Ralfs, p. 115, Pl. XXXIII.—With the above. Aug.

138. *M. pinnatifida* (Kg.), Ralfs, p. 116, Pl. XXXVIII.—Spring west of college (L. H. Merrill). May.

139. *Staurastrum muticum*, Breb. p. 119, Pl. XXXIX.—Swamp back of college woods. Aug.

140. *St. dejectum*, Breb. p. 121, Pl. XI.—With above. Aug. Also roadside pool west of Orono. June.

141. *St. dejectum*, var. *mucronatum*, Ralfs. Moosehead Lake. Gathering by Dr. Young. Specimens 48 μ diameter. July.

142. *St. Dickiei*, Ralfs, p. 122, Pl. XL.—Swamp back of college woods. Aug.

143. *St. margaritaceum*, Ehrb., p. 125, Pl. XLI.—Moosehead Lake. July. (Dr. Young).

St. polymorphum, Breb., p. 126, Pl. XLII.—Reported before, (No. 53) but specimens found this season were *pentagonal* in end view and the diameter 48 μ.

144. *St. regulosum*, Breb., p. 127, Pl. XLI.—Swamp back of college woods. Oct.

145 *St. alternans*, Breb., p. 128, Pl. XLI.—Associated with *Staurospermum viride*. Guagus Stream. July.

146. *St. gracile*, Ralfs, p. 133, Pl. XLIII. Swamp back of college woods. Aug.

147. *St. aculeatum*, Ehrb., p. 140, Pl. XLV.—With above. Aug.

148. *St. echinatum*, Breb., p. 141, Pl. XLV.—With above. Also roadside pool west of Orono. Aug. and June.

149. *St. spongiosum*, var. *Americanum*, Turner, Some New and Rare Desmids, Jour. R. M. S., Ser. II, Vol. V. Swamp back of college woods. Aug.

CLASS III.—CYANOPHYCEÆ.

Family XVIII.—Nostocaceæ.

150. NODULARIA MAINENSIS, n. spec. Trichomes long, 33 to 38 μ wide, æruginous; articulations short, 2 to 6 or more, frequently 4 to 6 in diameter; sheath distinct but close; heterocysts compressed, oval, orange, yellow or brownish-yellow, more or less at regular intervals. Found intermingled with *Vaucheria sessilis*, in Pushaw Stream, a tributary of the Penobscot, near Orono, Maine. July, 1888. Collected by F. L. Harvey. Mr. Wolle has examined specimens and regards it as new.

An Enumeration of the Plants Collected by Dr. H. H. Rusby in South America, 1885-1886.—VII.

(Continued from p. 160.)

BURSERACEÆ.

Protium unifoliolatum (Spruce), Engl. in Mart. Fl. Bras. xii. (2), 262. Falls of the Madeira, Brazil. (2578).

Protium pubescens (Benth.), Engl. l. c. 265. Reis, 1,500 ft. (2523). Junction of the Beni and Madre de Dios. (2593).

Protium Guianense (Aubl.), March. Adansonia, viii. 52. Guanai, 2,000 ft. (2568).

PROTIUM BOLIVIANUM, spec. nova. Arbor. Folia 15-18 cm. longa; ramulis petiolisque breviter ferrugineo-pilosis; foliolis subcoriaceis, supra glabris nitidisque, subtus reticulatis breviter ferrugineo-tomentosis, 2 vel 3-jugis, ovato-oblongis, 7-9 cm. longis, 4 cm. latis, breviter petiolatis; paniculis axillaribus, 7 cm. longis, tomentosis; pedicellis 1 mm. longis; calycis lobi 5, obtusi; petala 2 mm. longa, 1 mm. lata, glabra; stamina 1 mm. longa; ovarium glabrum. Unduavi, 8,000 ft. (2638). Related to *P. Spruceanum*, but with different foliage and calyx.

MELIACEÆ.

Guarea trichilioides, L. Mant. 228. (*Sycocarpus Rusbyi*, Britton, Bull. Torr. Club, xiv. 143). Guanai, 2,000 ft. (463); also from junction of the Beni and Madre de Dios. (1296).

Guarea, a species collected only in fruit and not satisfactorily determined. Junction of the Beni and Madre de Dios. (2590).

Moschoxylum propinquum, Miq. Guanai, 2,000 ft. (2352).

CELASTRINEÆ.

Maytenus uliginosus, HBK. l. c. vii. 65. Near Tacna, Chili. (2698).

Maytenus Chilensis, DC. Prodr. i. 9. Near Valparaiso, Chili. (2695).

RHAMNEÆ.

Rhamnus polymorpha, Reissek. Yungas, 6,000 ft. (2634); Mapiri, 2,500 ft. (2661).

Gouania tomentosa, Jacq. Amer. 263. Mapiri, 2,500 ft. (1381); Guanai, 2,000 ft. (1758).

Gouania sepiaria, Mart. Mapiri, 2,500 ft. (1486).

AMPELIDEÆ.

Vitis sicioides (L.), Baker, in Mart. Fl. Bras. xiv. pt. II. 202. Mapiri, 5,000 ft. (548); the *forma monstrosa* along the Beni River (1959).

Var. *ovata* (Lam.), Baker, l. c. 203. Beni River (2087).

Vitis trifoliata (L.), Baker, l. c. 212. Mapiri, 5,000 ft. (546); 2,500 ft. (549). I am accepting the species as taken by Mr. Baker.

SAPINDACEÆ.

Urvillea lævis, Radlk. in Herb. Kew. Guanai, 2,000 ft. (543).

Serjania confertiflora, Radkl. Consp. Serj. 4. Guanai, 2,000 ft. (1754).

Serjania Caracasana, Willd. Sp. Pl. iii. 465. Guanai, 2,000 ft. (540); Beni River (541).

Serjania erecta, Radkl. Consp. Serj. 8. Guanai, 2,000 ft. (525).

Serjania glabrata, HBK. Nov. Gen. v. 110. Falls of the Madeira, Brazil (539).

Serjania clematidifolia, Camb.? Mapiri, 2,500 ft. (517). Agreeing in foliage, but with much smaller flowers.

Serjania, related to *S. lethalis*, St. Hil. but with the fruit pubescent. Guanai, 2,000 ft. (524).

Serjania rubicaulis, Benth. Junction of the Rivers Beni and Madre de Dios (521); Beni River (523). The same as Spruce No. 4139.

Serjania rufa, Radkl. Consp. Serj. 16. Reis, 1,500 ft. (538); Guanai, 2,000 ft. (542).

Serjania, Sorata, 10,000 ft. (518).

Nos. 537, 545, 625 and 2699 are also probably of this genus, but they are not certainly determined.

Cardiospermum Helicacabum, L. Sp. Pl. 925. Reis, 1,500 ft. (526).

Paullinia riparia, HBK. Nov. Gen. v. 115. Guanai, 2,000 ft. (626). The same as Spruce No. 578, Herb. Kew.

Paullinia pinnata, L. l. c. 366. Falls of the Madeira, Brazil, (519 and 520); Reis, Bolivia (522).

Paullinia acutangula, Pers. Ench. i. 443. Guanai, 2,000 ft. (530 and 531).

Paullinia weinmanniæfolia, Mart. Herb. Fl. Bras. No. 69. Reis, 1,500 ft. (527).

Paullinia, a species probably undescribed. Guanai, 2,000 ft. (529).

Paullinia, a species collected only in fruit and without leaves. Junction of the Beni and Madre de Dios (2687).

Schmidelia lævis, St. Hil. Reis, 1,500 ft. (2086).

Schmidelia lævigata, Camb.? Falls of the Madeira, Brazil (544).

Schmidelia, related to *S. mollis*, HBK. Falls of the Madeira (552).

Schmidelia, same locality (1821).

Capunia scrobiculata, Rich. Junction of the Beni and Madre de Dios (1367).

Matayba scrobiculata (HBK.), Radkl. in Herb. Kew. Reis, 1,500 ft. (1385).

THINOUIA CORIACEA, sp. nova. Frutex scandens; rami teretes; folia bi- vel trifoliolata vel foliola in cirrus simplice transforma; foliola ovata, coriacea, 10-12 cm. longa, 7-8 cm. lata, integra, apice et basis obtusa, utrinque glaberrima; petiolis crassis, 1 cm. longis; samaræ tripteræ, columella persistente, subulata; samaræ 4 cm. longæ, speciose reticulatæ, alis erectis, integris. Guanai, 2,000 ft. (550), Nearly related to *T. myriantha*, Triana and Planch. Ann. Sci. Nat. (IV.) xviii. 368, but apparently a distinct species.

Talisia esculenta (Camb.), Radkl. in Herb. Kew. (*Sapindus esculentus*, Camb.) Beni River (1390).

Talisia cerasina, Radkl. in Herb. Kew. Falls of Madeira, Brazil. (2527).

Dodonæa viscosa, L. Mant. 238. Near La Paz, 10,000 ft. (500); Yungas, 4,000 ft. (2350).

ANACARDIACEÆ.

Anarcadium occidentale, L. Sp. Pl. 548. Junction of the Rivers Beni and Madre de Dios (1963).

Schinus molle, L. l. c. 1467. Near Valparaiso, Chili (1214).

Duvaua dependens (Ort.), DC. Prodr. ii. 74. Near La Paz, 10,000 ft. (1446).

Spondias lutea, L. l. c. 613. Falls of the Madeira, Brazil, (2594).

CONNARACEÆ.

Rourea glabra, HBK. Nov. Gen. vii. 41, var. TRIFOLIOLATA, n. var. Folia trifoliolata; foliola obovata, 10-15 cm. longa, 5-7 cm. lata; petiolis 6 cm. longis. Junction of the Rivers Beni and Madre de Dios. (1360 and 1370).

Rourea cuspidata, Benth. in Spruce, Exsic. No. 1901, Herb. Kew. Baker in Mart. Fl. Bras. xiv. (11) 181. Mapiri, 2,500 ft. (1336).

ROUREA (?) BAKERANA, spec. nova. Folia 15–20 cm. longa, 5–7 foliolata, ad maturitatum utrinque glabra; foliolis oblongis vel ellipticis, acutis, triplo longioribus quam latis, basi cuneatis vel obtusis; petiolis venisque minute griseo-sericeis, calycis et pedicellis valde griseo-sericeis; calyx persistens, minutus, post anthesin *non auctus;* capsula sessilis, solitaria, dense sericea, 15 mm. longa, pedicellis 2 mm. longis. Flores non vidi. Junction of the Rivers Beni and Madre de Dios (618). Differing from the described species of *Rourea* in the calyx remaining small in fruit. Named for Mr. J. G. Baker, the monographer of this order for the Brazil Flora.

Connarus fulvus, Planch. Linnæa, xxiii. 434. Mapiri, 2,500 ft. (1334). Collected in fruit; the pubescence which marks the species in its juvenile state entirely gone from these specimens.

Connarus, a species resembling *C. Beyrichii*, Planch., but with very different venation; probably undescribed. Junction of the Rivers Beni and Madre de Dios. (1335).

LEGUMINOSÆ.

Crotalaria Pohliana, Benth. Tayl. Ann. Nat. Hist. iii. 428 and in Mart. Flor. Bras. xv. (I), 20. Mapiri, 5,000 ft. (937).

Crotalaria incana, L. Sp. Pl. 1.05. Falls of Madeira, Brazil, (942); Yungas, 6,000 ft., a branching form with few-flowered racemes, (939); Guanai, 2,000 ft., a thin-leaved form, collected in fruit (943).

Var. *grandiflora*, Benth. mss. in Herb. Kew. Sorata, 10,000 ft. (940). The same as Matthew's Peru No. 916.

Crotalaria anagyroides, HBK. Nov. Gen. vi. 404. Yungas, 4,000 ft. (941).

Crotalaria brachystachya, Benth. Linnæa, xxii. 512. Falls of the Madeira, Brazil. (938).

Corema in New Jersey.

By John H. Redfield.

In an article upon the localities of *Corema Conradii* which appeared in the BULLETIN for Sept., 1884, (Vol. xi. p. 97) I referred to a locality of this plant at Cedar Bridge, N. J., which was known to Rafinesque, and which was visited by Dr. Torrey in 1833, who described the plant and defined its Cedar Bridge station, in the Annals of N. Y. Lyceum of Natural History, Vol. iv. p. 83. I also gave some account of an unsuccessful search for the plant at Cedar Bridge made by the late Chas. F. Parker and myself in April, 1869. In a short account of that search given in Proc. Phil. Acad. Nat. Sci. for 1869, pp. 91, 92, I stated that if the plant "is again to be discovered in New Jersey, it will probably be in the wide sandy waste a few miles west of Cedar Bridge, near the boundary between Burlington and Ocean counties, where a succession of elevated ancient ocean beaches offer conditions similar to those of Cape Cod." But up to the date of my paper of 1884, and for several years thereafter, the *Corema* had seemed lost to New Jersey, and the locality at Lake Minnewaska on the Shawangunk Ridge in Ulster Co., N. Y.—made known by Aubrey H. Smith in 1881—was regarded as the most southern point which could be surely cited for the habitat of this plant.

About three years ago Mr. F. J. H. Merrill of Columbia College, in the course of an examination of the Yellow Drift of Ocean Co. N. J., discovered the *Corema* in the very region which I had indicated in my communication to the Philadelphia Academy in 1869, and reported the fact to Dr. Britton, who visited the locality with Messrs. Thos. Hogg and J. I. Northrop in May, 1887. In April of this present year Dr. Britton proposed that I should join him in an expedition to the place. Accordingly on the 30th. Dr. Britton, with Mr. Arthur Hollick, Dr. J. Bernard Brinton and myself visited the location, which is about two and one-half miles due west from Cedar Bridge, and about ten miles west of the R. R. station at Barnegat. It lies on both sides of the county line dividing Ocean and Burlington counties. It is easiest reached from Barnegat, by taking the straight road from that place to Cedar Bridge (about eight miles) then taking the straight road running west-northwest from Cedar Bridge toward Buddstown, for about two and one-half miles to where that road is crossed by a north and south road, and following this for half or two thirds of a mile south.

The region is a most remarkable one, which cannot fail to impress every visitor with a sense of loneliness and sterility. It forms part of the water-shed or divide between the streams flowing into the Atlantic and those discharging into the Delaware river. Locally it is known as the "West Plains," but these so-called "plains" are long undulating swells of sand, sometimes rising to a height commanding extensive views in every direction over a desert of sand so sterile that even the trees of *Pinus rigida*, which sparsely clothe it, can attain only to the height of three or four feet. No sign of human life is visible, and one could readily imagine himself in the midst of a vast wilderness. Its height above the ocean is between 150 and 200 feet, according to the Geological Survey. The region is bisected by the north and south road I have mentioned, by the side of which the usual low matted patches of the *Corema* appear. But on leaving the road to examine the extent of its distribution we became amazed at the expanse of territory more or less covered by it. We followed over the rising swells of ground already alluded to, both to the east and west of the road to the extent of at least half a mile each way, and for a like distance in the opposite direction, without entirely losing sight of the *Corema*, and we probably did not reach its limits. To say that there are hundreds of acres of it is a statement which my companions thought to be far short of the truth. In some places the patches were separated by intervals of some rods, but oftener scores of them were seen at once, and in many places they became confluent in large masses, reminding one of the appearance of the plant at Plymouth, Mass. Besides the thinly scattered stunted pines, little shrubbery was seen other than occasional very small specimens of *Quercus ilicifolia*, but the sandy spaces were often partially covered with *Arctostaphylos Uva-ursi*, and the whole region reminded one of the downs of the interior of Nantucket, where the *Arctostaphylos* is so very abundant. Occasional carpets of *Pyxidanthera* were near, but rarely with the *Corema*. Though our visit was made before April had expired, the unusually advanced season had carried the *Corema* beyond its flowering stage, and its stamens were mostly withered, though not fallen. Staminate and pistillate plants seemed equally abundant.

When Mr. Merrill first discovered this locality, it was, I believe, unscathed by fire, but at the time of Dr. Britton's first visit the region had been burned over, so far as it was possible to burn so sparse a growth, and the low pines had been singed and mostly killed. Now among the blackened trunks fresh sprouts of these pines are appearing. But what most excited our surprise was to see myriads of young seedling plants of the *Corema* springing out of the sand, in the intervals between the patches, and it would seem as if the seeds carried by the winds had availed themselves of every spot of bare sand, there to lodge and germinate. None of these seedlings were more than two years old, many not more than one. In none of the many localities of *Corema* which I have visited do I remember to have seen such seedlings, except upon the summit of Isle au Haut on the coast of Maine, where the ground had been burned over in like manner.

In illustration of the apparently capricious manner in which this plant appears, I may mention that on our return to Barnegat we saw two or three patches of it on the south side of the road about three miles west of Barnegat, within half a yard of the wheel-track. Search for more of it in this vicinity was unsuccessful, so also was a re-examination of the original locality near the old western hotel at Cedar Bridge.

We may now restore the *Corema* to the Flora of New Jersey, with the assurance that this, its most southern locality yet known, can furnish enough of it to supply the botanists of the world for long to come.*

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*The following letter, addressed to me by Dr. Willis in answer to an inquiry, indicates that careful search might reveal still additional localities. N. L. B.

WHITE PLAINS, Nov. 7, 1884.

MY DEAR SIR :

Yours of the 3d. to hand. We found Corema *west* of Tom's River—and *north* of Manchester. Also west of *Squam*, south of the river. It was not rare in those neighborhoods. It is though, at least thirty years since I visited them, and the localities have perhaps been exhausted. Dr. Torrey was accustomed to say that civilization was destined to destroy botany.

Cordially,

O. R. WILLIS.

Botanical Notes.

Kansas Fungi. Kellerman and Swingle. (Fascicle I., Nos. 1–25, May 1, 1889, price $1.25). This very compact little set of fungi contains a liberal supply of neatly prepared specimens, which though including some common species, still gives well selected specimens of some good things in the following genera: *Æcidium*, *Ceratophorum*, *Cercospora*, *Glœosporium*, *Melasmia*, *Microsphæra*, *Peronospora*, *Phragmidium*, *Puccinia*, *Ramularia*, *Rœstelia*, *Scolecotrichum*, *Septoria*, *Sphærotheca*, *Uredo* and *Ustilago*. E. G. B.

Pittonia. We record the completion of the first volume of Professor Greene's "Series of Papers relating to Botany and Botanists," the last pages being issued May 31st. The volume consists of 311 pages, and the last part, (part 6), is accompanied with a very complete index. Surely no worker in systematic botany can afford to be without this valuable contribution to the knowledge of our North American flora.

Memoirs of the Club. The first number of this new serial, containing Professor Bailey's paper on his study of the type specimens of *Carex* in the herbaria of America and Europe, was issued May 25th. Subscriptions to the MEMOIRS will be welcomed by the editors, who trust that American botanists will find the series worthy their support. Mr. Martindale's paper on the Algæ of the New Jersey and Staten Island Coasts is in press and will form the second number of Volume I.

White-fruited Mitchella again. Mr. A. W. Hosmer reports another locality for this form of the Pigeon Berry, in the town of Stow, about six miles from Concord, Mass., where it was detected several years since by Mr. B. R. Joyce, who states that the patch is about ten by twelve feet square.

Note on Tissa. In my recent paper on the American forms of this genus (BULLETIN, xvi. 125-129), I remarked that it would be interesting to note its treatment in Engler and Prantl's "Natürliche Pflanzenfamilien." The 33rd part of this work containing the Caryophylleæ, by Herr F. Pax is just received. He properly calls it *Tissa* and credits it with twenty species.

N. L. B.

Reviews of Recent Foreign Literature.

A Handbook of Cryptogamic Botany. By Alfred W. Bennett and George Murray. 8vo, pp. 473, 378 illustrations. London and New York: Longmans, Green & Co., 1889. Price, $5.00.

Students of botany, of whatever line of research, have long felt the need of a volume wherein could be found accurately and concisely stated the known facts concerning the structure, affinities and life history of the lower members of the vegetable kingdom. The need of such a work has, indeed, proved an obstacle in the way of their investigation and study, so that the great majority of botanists are almost entirely ignorant of all but the most general and apparent characteristics of this great portion of the world of plants. The literature of the subject is so vast as to be within the reach of but few, and but fewer have the time or the inclination to devote to this branch of knowledge. It has therefore come to be in the possession of a few specialists who write mainly of their specialties for others of their ilk, and but rarely for the world at large.

The bringing together of this widely scattered and highly specialized information and its correlation into an orderly series has been the work of Messrs. Bennett and Murray, and they have done it well. The senior author has elaborated the chlorophyll-bearing groups, and the junior has written of those in which that substance is wanting. The classification adopted is made the subject of a portion of the Introduction. The Pteridophyta and Bryophyta are taken on the generally recognized lines, excepting that the Sphagnaceæ are not separated as a class, although the authors are not strenuous in the opinion that they form but an order of Musci. But the treatment of the Thallophyta is very different from what we have recently had, with the exception noted in our last issue. The Characeæ are held to be a distinct class, and are put between the Musci and the higher Algæ. The Thallophyta are then treated as (1) Algæ and (2) Fungi. The Algæ are grouped according to Professor Bennett's recent paper in the Journal of the Linnæan Society, the Fungi follow the arrangement of DeBary, and the Lichens are allowed to come within the definition of Fungi and are treated among the several divisions of that class. While no one is perhaps at the present time seriously questioning the algo-fungal hypothesis, the wisdom of splitting up a great natural group may very properly be doubted. We believe that the plants will long be studied as Lichens, whatever may be their nature and origin.

The term Protophyta is retained for the lowest plants as a matter "of convenience rather than of principle," and they are considered under the headings Schizophyceæ and Schizomycetes; the first includes, besides Protococcoideæ and Cyanophyceæ, the Diatomaceæ, here removed from their relationship to the Desmids in the class Conjugatæ, on the plea that their method of reproduction is not sexual, in which position we presume Prof. Bennett will not find universal agreement.

The terminology is considerably revised, and a number of new terms added. The word "reproduction" is restricted to a process resulting in the formation of one or more new individuals, all cases of non-sexual multiplication being described as "propagation"; similarly, bodies which are the direct result of sexual impregnation are termed "sperm," as distinguished from "spore," which term is restricted to cells for vegetative propagation, and words in which these syllables occur are made to correspond. The book is thoroughly illustrated, clearly written, and has interspersed abundant references to the most important literature. Botanists should be grateful to its distinguished authors for their great contribution to our pleasure and profit. N. L. B.

Lichenes Novæ Zelandiæ.

Dr. Nylander of Paris has recently published a work with the above title (Paris: Paul Schmidt, pp. 151, 1888) giving 371 species, which is the fullest account of New Zealand lichens yet issued. Added are some corrections and additions to his "Lichens of Fuegia and Patagonia." A few points are of interest to American lichenologists.

On page 58 is described a new *Placodium, P. constipens;* thallus fruticulose-cæspitose, orange colored, erect, the laciniæ flat; apothecia terminal, of the same color; spores oblong, simple, .010-14x.0045-65 mm. Farallone Islands, San Francisco.

A sterile plant in the collections of the Hassler Expedition, called by Tuckerman, "*Alectoria*, perhaps a new species," is said to be *Cetraria epiphorella*, Nyl. Lich. Fueg. p. 20, but according to Müller in "Lichenes Spegazziniani" (Nuovo Giornale Bot. Ital., Jan. 1889) this is *C. aculeata* var. *gracilenta*, Krempelh. Exot. Flechten, p. 315 (1868).

The name *Erioderma velligerum*, Tuck. Syn. ii. 143, is changed on grammatical grounds to *E. vellerigerum*. *Pertusaria colobina*, Tuck. l. c. 149, hardly differs from *P. cucurbitula*. *Opegrapha robustula* is a new species from Chili. *O. atra*, Pers., from the Straits of Magellan; *Arthonia subdispersula*, with the preceding.

Buellia Catawbensis, Willey, which had been called by Nylander a *Dermatiscum* and had a place among the Lecanorei next to *Rinodina*, is here restored to its original place in the *Lecidei*.

H. W.

Contributions towards a Flora of Caithness. By J. F. Grant and Arthur Bennett. (Pamph. 8 vo., pp. 41; Perth, 1889; reprinted from the "Scottish Naturalist.)"

This is a record of plant stations in the most northern country of the mainland of Scotland, made up from observations and collections by the authors as well as by numerous other botanists. A feature of the catalogue is the entire omission of authors' names after the species.

Index to Recent American Botanical Literature.

Aerating Organs on the Roots of Swamp and other Plants. Wm. P. Wilson (Proc. Phil. Acad. Nat. Sci., April 2; reprinted, pp. 3.)

From extended studies of the "knees" of the Bald Cypress (*Taxodium distichum*) Professor Wilson concludes that they serve as structures to aerate the subaqueous and subterranean portions of the tree. He states that when cultivated in dryer soils it never forms the knees. Among other plants mentioned which produce similar structures he records Indian Corn (*Zea Mays*), the Pond Pine of the South (*Pinus serotina*), the Water Tupelo (*Nyssa aquatica*) and the Mangrove (*Avicennia nitida*).

Algen aus Feuerland und Patagonia. J. B. DeToni (Hedwigia, xxviii. 24-26). A list of 16 species collected by Dr. Carl Spegazzini.

Analogies and Affinities. Edward L. Greene (Pittonia, i. 289-300).

This is a very timely and instructive paper on characters which are best for the classification of plants, and should be carefully weighed by all who are studying systematic botany. Professor Greene considers the genus *Palmerella* properly reducable to *Lobelia* and refers thence *P. debilis* as *L. Dunnii*, the var. *serrata* as *L. Rothrockii* and *P. tenera* as *L. Palmeri.*

Big-rooted Plants of the Plains—Two. Chas. E. Bessey. (Amer. Nat. xxiii. 174-176; illustrated). An interesting account of *Cucurbita perennis*, Gray, and *Ipomœa leptophylla*, Torr.

Brodiœa Palmeri. Garden and Forest, ii. 244, Fig. 107).

California Lilacs. C. L. Anderson. (Garden and Forest, ii. 279). Under this heading is given a list and short description of the California species of *Ceanothus.*

Capparis Arten—Ueber einige. L. Radlkofer. (Sitzungb. Köng. bayr. Akad. Wissenschft. Math. phys. Classe, xvii. 365-422). References to some American species: *C. anceps*, Shuttlew. from Florida=*C. Jamaicensis.*

Carex—Studies of the Types of various Species of the Genus. L. H. Bailey (Mem. Torr. Bot. Club, i. 1-85).

Professor Bailey has been going to the very base of his favorite study by inspecting all the type specimens of original descriptions of Carices that are extant in Europe and America, and in this paper gives us the result of his investigations. He finds that a considerable number of species have been quite misunderstood by American authors, and this fact necessitates the shifting of names from one plant to another in some cases, and the entire re-naming of the plant in others. Besides this his studies afford descriptions of a large number of new species and varieties, making this a most important contribution to American systematic botany and to caricology in general.

Carolina Hemlock—The. (Garden and Forest, ii. 267, illustrated.)

Chrysobalanaceen—Beitræge zur Kenntniss der, I. Conspectus generis Licaniæ. Karl Fritsch. (Annalen der K. K. Naturhis. Hof Museum, Vienna, iv. 33-60).

Herr Fritsch's first detailed contribution to the study of the Chrysobalanaceæ consists of a list of species of *Licania*. Of these he recognizes 60, including those described under *Moquilea*, which genus he considers inseparable and in this differs from Bentham and Hooker. The genus is entirely restricted to tropical America. A considerable number of new species are described.

Cladosporium epibryum, Cke. and Mass. (Grevillea, xvii. 76). A new species, found upon capsules of various mosses in the United States. (Mrs. N. L. Britton).

Clavaria clavata, Peck. (Grevillea, xvii. 98). This species (Ellis' N. A. Fungi, No. 613), is stated to be "undoubtedly the same as *C. paludicola*, Lib., Pl. Crypt. Ard. fasc. 4, No. 322, (1837)."

Cuphea aus Argentinien—Eine neue. E. Koehne. (Verhand· Bot. Soc. Prov. Brandenberg, 1888, 277, 278).

Downy Mildew and Black Rot—Report on the Experiments made in 1888 *in the Treatment of the.* (Bull. No. 10, Bot. Div. U. S. Dep't Agric.; Washington, D.C., 1889).

Flora of the Bahamas—Report of the Committee Appointed for the Purpose of Exploring the. (Proc. British A. A. S. Bath Meeting, 1888; also reprinted, pp. 3).

An account of the collections hitherto made in this most interesting floral province with especial reference to the work of Baron Eggers, and an analysis of the Bahaman Flora.

Floral Features of the Amazon Valley. H. H. Rusby. (New England Druggist, 1889, 14-19).

This is the text of a lecture delivered by Dr. Rusby before the Massachusetts College of Pharmacy, and details vividly, from his extended personal experience, the floral characters and the floral wealth of Amazonia.

Fertilization of the Phanerogams—Observations on the. John Kruttschmitt. (Microscope, ix. 170-172, illustrated).

Notwithstanding all that has been said and written upon the pollen-tube question, the author has pursued some further investigations and again invites criticism.

Forage Plants of Southern California—Some Native. C. R. Orcutt (West Amer. Sci. vi. 41, 42). Notes on *Erodium cicuta-*

rium (hardly native !) *Hilaria rigida*, *Hosackia glabra* (Deer Weed), and *Franseria dumosa.*

Fungi nonnulli Paraguariæ et Fuegiæ. C. Spegazzini. (Revue Mycol. xi. 93-95). *Phaneromyces* is a new genus based on *Niptera* (?) *macrospora*, Bond, and there are new species described in *Pleurotis*, *Clicotybe*, *Polystictus* and *Favolus.*

Geaster argenteus, Cooke. (Grevillea, xvii. 75). A new species from the Saskatchewan. (N. W. Am. Ex. Exp).

Ilicineæ and Celastraceæ—Revision of North American. Wm. Trelease (Trans. St. Louis Acad. Sci. v. 343-357 ; reprinted as Contr. from Shaw School of Botany, No. 5).

Pending the continuation of the Synoptical Flora of North America, Professor Trelease issues provisional monographs on these small orders as he has previously done for some other groups hoping thereby to secure additional information concerning them, having about exhausted the material at his command in a critical study of the specimens preserved in the larger Herbaria. Fourteen species of *Ilex* are recognized, *I. longipes*, Chapm., being here first published, and a plant collected by Garber at Tampa, Fla., is described as *I. ambigua*, Chapm., var. (?) *coriacea.* Neither of the two published varieties of *I. verticillata* are kept up, in which there is room for some difference of opinion. The resemblance of some of our species to those of Eastern Asia is made the subject of remark. In the Celastrineæ, Prof. Trelease finds a new species of *Euonymus*, *E. Parishii* from the San Jacinto Mountains, California, (Parish, No. 957). In the matter of nomenclature he is on the fence, for while calling his plants by their old binomials he is careful to state what the others are to be, " if," as he says, " the specific name is to be accepted," thus putting himself into a position to be cited for the proper names. This is certainly very shrewd, but is at all events a hopeful and encouraging sign of the extension in a quite unexpected direction of the principles of a sound nomenclature. Among the most noteworthy of these cases *Nemopanthes Canadensis*, DC., becomes *N. mucronata* (L.), Trelease, being the *Vaccinium mucronatum* of Linnæus and as *Cassine Caroliniana*, Walter, *Ilex ambigua*, Chapm., becomes *I. Caroliniana* (Walt.) Trelease.

N. L. B.

Lichenopsis—What is? M. C. Cooke. (Grevillea, xvii. 94–96).

A dissertation founded upon certain problematic specimens collected in the United States. A new genus is erected, *Platysticta*, in which is included *P. magnifica* (B. & Br.),=(*Platygrapha magnifica*, B. & Br., and *B. simulans*, Cke. and Mass.=(*Lichenopsis sphæroboloides*, Berk. in Herb. pro parte). This latter new species was determined from specimens in Herb. Berk., which were mixed with and included under some of Schweinitz's *L. sphæroboloides*, which it closely resembles.

List of plants collected by Dr. E. A. Mearns at Ft. Verde and in the Mogollon and San Francisco Mts., Arizona, 1884-1888. N. L. Britton. *General Floral Characters of the San Francisco and Mogollen Mts., and the adjacent region.* H. H. Rusby. (Trans. N. Y. Acad. Sci. viii. 61–81, reprinted.)

The list enumerates over 300 species, many of them rare, and the following are described as new; *Viola Canadensis*, var. *scariosa*, Porter; *Hosackia Mearnsii; Lathyrus Arizonicus; Castilleia gloriosa; Audibertia Mearnsii; Eriogonum Mearnsii*, Parry. The following specific names are restored: *Stanleya pinnata* (Pursh, 1813,) for *S. pinnatifida*, Nutt. 1818; *Bahia dissecta* (Gray, 1849) for *B. chrysanthemoides*, Gray, 1883; *Pseudotsuga taxifolia* (Lamb. Gen. Pin. i. 51) for *P. Douglasii*, Lamb. l. c. iii. 163; *Calypso bulbosa* (L. 1753), for *C. borealis*, Salisb. 1807. The restoration of older generic names entails the following changes in binomials: *Micrampales Gilensis* (Greene), Britt. for *Echiocystis Gilensis*, Greene, *Unifolium racemosum* (L.), Britt. for *Smilacina racemosa*, Desf. Dr. Rusby's acccount of the floral features of the region is given from the notes of his collecting tour in 1883.

Loco Weed. L. E. Sayre. (Drug. Bull. iii. 145–149, illustrated.)

Excellent figures are given of *Oxytropis Lamberti*, *Astragalus mollissimus* and *A. tridactylicus*.

Loco Weeds—Notes on the so-called. Fredk. B. Power. (Pham. Rundsch. vii. 134-137.)

Macrosporium parasiticum, Thum.—On the Life History of. Kingo Miyabe. (Annals of Bot. iii. 1–26; two plates).

This paper embodies the results of an interesting research carried on by Mr. Miyabe in Professor Farlow's laboratory, on a fungus disease of onions in Bermuda. The species is shown to be identical with *M. sarcinula*, Berk. and to have for its ascosporus stage the common *Pleospora herbarum* (Pers.), Rabenh.

Nitella diphylla. (Vick's Monthly, xii. 189, illustrated).

Pentstemon rotundifolius (Bot. Mag. Tab. 7055).

Phoma corvina. (Grevillea, xvii. 75). A new species from S. Carolina, on *Gossypium* (Ravenel No. 588).

Physiological Botany—Principles of—As applied to Horticulture and Botany, xvii, xviii, xix, xx. Geo. L. Goodale (Garden and Forest, ii. 201, 202; 213, 214; 225; 249-250). This valuable series of papers is here concluded.

Plants from the Bay of San Bartolomé, Lower California. Edward L. Greene (Pittonia, i. 287, 288). *Arabis pectinata, Astragalus Pondii* and *Lupinus Pondii*, spp. nn., are described from specimens collected by Lieut. Chas. F. Pond, U. S. A.

Raphidodiscus—The affinities of. C. M. Vorce. (Microscope, ix. 132–137, Pl. vi.). *R. Febigerii, R. Marylandica, and R. Christianii* are figured.

Reminiscences of Major John E. LeConte Mary Graham. (Pittonia, i. 303–311).

Report of the Botanist of New York State Museum of Natural History for the year 1886. Chas. H. Peck. (40th Report N. Y. State Mus. Nat. Hist. pp. 39-77).

Mr. Peck's report records many interesting facts, and we regret that the publications of the Museum must be so long delayed, preventing the prompt announcement of his gathered information. We note with satisfaction the continued growth of the State Herbarium, 104 species not previously represented having been added to it and listed in this report, together with numerous specimens of species already there. The great bulk of these are Fungi, contributed by Mr. Peck himself. The Anthophyta new to the collection are *Geum macrophyllum*, from Lower Ausable Pond, Adirondack Mountains (Peck); *Lactuca Scariola*, introduced, but apparently well established in Clyde, Wayne Co. (Peck); *Mimulus moschatus* from Locust Valley and *Amianthium muscætoxicum* from Valley Stream, Long Island, found by the late Mr. Bisky and already noted by him in the BULLETIN; *Juncus* *militaris*, in Mud Pond and Clear Pond, near Long Lake, Adirondacks (Peck). 47 fungi are described as new species!

N. L. B.

Rhamnaceæ—North American. William Trelease, (Trans. St. Louis Acad. Sci. v. Reprinted.)

In the preparation of this monograph the author has consulted some of the principal European herbaria, in addition to those of this country. Twelve genera and, exclusive of *Ceanothus*, twenty-six species, are credited to our flora. The latter genus, having been recently monographed by the same author, is omitted from the present paper. With the thirty-two species there recorded he credits in all fifty-eight species to North America. *Rhamnus rubra*, Greene, is not regarded as distinct, and is written *R. Californica*, Esch., var. *rubra*. *R. crocea*, Nutt., var. *pilosa*, is contributed. Better material of the doubtful No. 770 of the Parish collection is called for. The author's position regarding the citation of authors is wholly equivocal. For example, in citing *Sageretia minutiflora* (Mx.) he endorses the popular error of calling it *S. Michauxii*, Brongn., but says in conclusion: "If the specific name of Michaux is to be retained, the plant becomes *S. minutiflora* (Michaux)." Thus, while virtually contending that an error, once fixed, must be perpetuated, he places himself in a position where he must be quoted as its expurgator.

H. H. R.

Rudbeckia laciniata. (Garden and Forest, ii. 279, Fig. 113).

Smilax officinalis. (Bot. Mag. Tab. 7054).

Species—New or Noteworthy.—V. Edward L. Greene. (Pittonia, i. 300-302).

Potentilla frondosa, *Tissa leucantha*, *Paronychia pusilla*, and *Greenella ramulosa* are new species, and *Œnothera leptocarpa* is the name applied to *Eulobus Californicus*, Nutt., there being already an *Œ. Californica* of Watson.

Yucca angustifolia. (Garden and Forest, ii. 244; illustrated).

Wisconsin Weeds.—Notes on. W. A. Henry. (Agric. Sci. iii. 83-85)

The weed law of Wisconsin, it seems, has had the effect of causing a number of plants, regarded as weeds in certain localities, to be sent for determination to the Agricultural Experiment

Station. Amongst the unlooked for plants was *Oxybaphus nyctagineus*, which is described as growing so rank in one locality in a corn field, that "one could hardly make his way through the field because of it." *Hordeum jubatum* is said to be "entirely too common along the road-sides and in old meadows."

Proceedings of the Club.

The regular monthly meeting was held Tuesday evening, June 12, 1889, the President in the Chair and ten persons present.

Dr. W. E. Wheelock was elected an Active Member.

The Field Committee reported on the several Field Days held since the last meeting, especially on those at Prince's Bay, Staten Island, and Pocono Summit, Pennsylvania, which were largely attended. The latter was participated in by a delegation from the Botanical Section of the Academy of Natural Sciences of Philadelphia and other botanists, and an extremely enjoyable and interesting trip experienced under the guidance of Professor Porter. Among the best discoveries were the finding by Mrs. Britton of *Botrychium simplex* in a low meadow near Naomi Pines; of a single bush of *Lonicera cærulea* by Mr. John K. Small, and of *Poa debilis* by Professor Porter—all new to the flora of Pennsylvania; of *Deyeuxia Porteri* by Dr. Britton, new to the one hundred mile circle. Some of the party stopped over for a day at the Delaware Water Gap on the way home and ascended Mt. Minsi on the Pennsylvania side of the river, and were fortunate enough to discover there in an almost inaccessible place the rare *Asplenium montanum*, formerly obtained from the cliffs of Mt. Tammany on the New Jersey side by Rev. S. W. Knipe.

A paper by Mr. Redfield on "*Corema* in New Jersey," was read by the Secretary.

Miss Cannon exhibited specimens of *Galium Mollugo* from Jackson, Queens County, N. Y., and it was remarked that this common European weed is gradually becoming more abundant with us.

Mr. I. C. Martindale's paper on "Algæ of the New Jersey and Staten Island coasts" accepted for publication as No. 2 of the MEMOIRS, was read by title.

The Club adjourned until the second Tuesday in September.

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XVI.] New York, August 1, 1889. [No. 8.

On a Fossil Marine Diatomaceous Deposit from Atlantic City, N. J.—II.

By C. Henry Kain and E. A. Schultze.

Plates XCII. and XCIII.

(Continued from page 76.)

Since the publication of the first paper upon this deposit, the well from which the specimens were obtained has been sunk to a depth of over 1200 feet, so that the range of the diatomaceous strata can now be pretty well determined. The richest portions are at the depths, respectively, of 406,550 and 625 feet. While all the strata contain many species in common, yet the stratum at 406 feet appears to be essentially different from the others in regard to the size and general character of species. At a depth of 625 feet a stratum about four feet in thickness occurs, in which the predominant forms are identical with those found at 550 feet. Below this, only a few scattered diatoms are found, until a depth of 677 feet is reached, when they disappear entirely. As these beds begin at a depth of 387 feet, it will therefore be seen that, including the sand beds which separate them, the series occupies a thickness of about 290 feet. It is interesting to note that, throughout the entire deposit, iron pyrites in minute crystals is abundant, and when specimens of the dry earth are placed under the microscope, the glittering crystals of pyrites are often very beautiful. Microscopists probably remember how great an interest was excited, a few years ago, by the announcement that diatoms had been discovered in the London clay, so coated with pyrites as to appear gold-plated. The circumstance was considered rather remarkable. In this deposit, the mineral appears in crystals rather than in the form of a smooth coating, and doubtless the partial disintegration of the valves that is sometimes noticed is due to the chemical action of the pyrites.

In addition to the list of species previously published, the following have been observed:

Anaulus birostratus, Grun. Very rare.

Aulacodiscus Solittianus, Norman.

BIDDULPHIA BRITTONIANA, Kain and Schultze, n. sp.

Valve oblong elliptical, terminating in apparently hollow, large processes, which originate a little to the side of the extremities and incline in opposite directions. From the base of each of these processes arise one, and sometimes two, semi-circular, awl-shaped spines. Along the margins and in the center the valve is partly covered with a fine, hair-like growth, intercepted by two longitudinal striated bands. (Plate XCII., Figs. 1, 1a, 1b, 1c).

The structure of this very curious species seems, at first, quite puzzling. The frustules appear to be formed of two valves united with their convex sides together and the concave sides outward—exactly contrary to received ideas as to the structure of a diatom frustule. After a careful study of broken shells, it will be seen that these apparent frustules are in reality valves of different frustules; that the hoops, being easily destroyed, have disappeared in the process of cleansing, but the setæ being more strongly siliceous, have withstood the treatment and held together the valves of different frustules.

In a specimen of *Stauroneis acuta*, kindly furnished by Prof. H. L. Smith, a similar phenomenon occurs. The hoops have disappeared during treatment, and valves of different frustules have united to form false frustules, in which the shells have their convex sides together, and their concave sides outward.

While the alternation of the sub-lateral processes indicates an alliance with Ehrenberg's genus, *Cerataulus*, we prefer to adopt the view of Professor Smith, who unites this genus with *Biddulphia*.

Figures 1, 1a and 1b are reduced from drawings kindly furnished by Rev. Francis Wolle.

Biddulphia longispina, Grun.

Biddulphia Weissflogii, Grun.

BIDDULPHIA ? ? Kain and Schultze, n. sp.

Valve broadly elliptical; punctæ irregular; surface broken by numerous free bands ramifying from the center; two slight elevations at each extremity. (Plate XCIII., Fig. 4).

While this curious form lacks the processes which belong to the genus *Biddulphia*, it seems more closely allied to this than to any other genus. A somewhat similar form occurs in the fossil deposit at Ananino, Russia.

Cestodiscus ovalis, Grev.

For the recording of this species we are indebted to Dr. D. B. Ward, of Poughkeepsie.

Chætoceros (*didymus*, Ehr.?) (Plate XCII., Fig. 6).

Cyclotella operculata, Kütz.

Discoplea physoplea, Ehr.

Epithemia gibba (Ehr.), Kütz. Rare.

EUNOTIA AMERICANA, Kain and Schultze, n. sp.

Valve arcuate; dorsal ridge convex and constricted into broadly rounded ends. Striation exceptionally fine. (Plate XCIII., Fig. 1).

Eupodiscus radiatus, Bailey, var. *antiqua*, J. D. Cox.

While this species bears a general resemblance to *Eupodiscus radiatus*, the cellules are not radiate nor of equal size, but are much smaller towards the margin. General Cox has noted the same form in the Richmond deposits, and instead of considering it a distinct species, he prefers to consider it merely a variety.

Hemiaulus affinis, Grun.

Grammatophora serpentina, Ehr. var. (Plate XCII, Figs. 5 and 5a).

Hyalodiscus lævis, Ehr.

Liradiscus minutus, Grev.

We are indebted to Dr. Ward for a beautiful photograph of this species found in the deposit.

NAVICULA DE WITTIANA, Kain and Schultze, n. sp.

Valve broadly lanceolate; median line stout; striæ costate, convergent at the middle of the valve and radiate towards the apices; intermediate free space broad. (Plate XCIII., Fig. 5).

Navicula Lewisiana, Grev.

Navicula Lyra, Ehr.

The type form and several varieties are frequent.

Navicula (*Pinnularia*) *macilenta*, Ehr. Rare.

Plagiogramma Gregorianum, Grev.

Rhaphoneis gemmifera, Ehr.

Sceptroneis gemmata, Grun.

Stictodiscus Kittonianus, Grev.

Terpsinoe intermedia, Grun. var. (Plate XCIII., Figs. 2 and 2a).

Triceratium Ehrenbergii, Grun. (*Discoplea undulata*, Ehr.)

TRICERATIUM HEILPRINIANUM, Kain and Schultze, n. sp.

Valve triangular; surface with central and angular elevations—the central elevation shaped like a truncated pyramid; punctæ radiate and coarser at center. (Plate XCIII. Figs. 3 and 3a).

We take pleasure in dedicating this beautiful form to Prof. Angelo Heilprin, the distinguished naturalist.

TRICERATIUM INDENTATUM, Kain and Schultze, n. sp.

Valve triangular with convex margins; extremities slightly constricted and double, produced by rounded indentations; cellules stout, radiating from center. (Plate XCII., Fig. 4)

Triceratium Kainii, var. CONSTRICTUM, Schultze, n. var.

Valve triangular, with deeply constricted margins; striation moniliform, convergent toward the center and intercepted by three costæ equi-distant between the produced apices and the unstriated center. (Plate XCII., Fig. 3).

Tryblionella Hantzschiana, Grun.

Tryblionella scutellum, W. Sm.

DESCRIPTION OF PLATES.

PLATE LXXXIX.

Fig. 1, 1a, 1b.—*Dimeregramma Novæ-Cæsaræa*, K. and S.
Fig. 2.—*Navicula Schultzei*, K.
Fig. 3.—*Biddulphia Woolmanii*, K. and S.
Fig. 4.—*Biddulphia Cookiana*, K. and S.
Fig. 5.—*Triceratium Kainii*, S.
Fig. 6, 6a.—*Triceratium semicirculare*, Brightw.
Fig. 7.—*Rhabdonema Atlanticum*, K. and S.

PLATE XCII.

Fig. 1, 1a, 1b, 1c.—*Biddulphia Brittoniana*, K. and S.
Fig. 2—*Auliscus Spinosus*, Christian. Reduced from Schmidt's Atlas der Diatomaceen-kunde, Plate CXXV., Fig 2.
Fig. 3.—*Triceratium Kainii*, var. *constrictum*, S.
Fig. 4.—*Triceratium indentatum*, K. and S.
Fig. 5a.—*Grammatophora serpentina*, var., K. and S.
Fig. 6.—*Chætoceros* (*didymus*, Ehr. ?)
Fig. 7.—*Actinodiscus Atlanticus*, K. and S.

PLATE XCIII.

Fig. 1.—*Eunotia Americana*, K. and S.
Fig. 2, 2a.—*Terpsinöe intermedia*, Grun, var.
Fig. 3, 3a.—*Triceratium Heilprinianum*, K. and S.
Fig. 4.—*Biddulphia ?* K. and S.
Fig. 6.—*Navicula De Wittiana*, K. and S.

White Mountain Willows.—III.*

By M. S. Bebb.

SALIX ARGYROCARPA, Anders.

When we think of all the botanists of the preceding generation who, at one time or another, were called upon to make some disposition of this beautiful willow, requiring a more or less critical study of its character,—Hooker, Pursh, Nuttall, Carey, Tuckerman, Barratt, and others—the wonder grows that some one of them did not recognize in it a distinct species. The habit of the plant, if nothing more, ought to have given a hint that the reference to *S. repens*, which they all seemed bent upon making, was a mistake. In the herbarium of the Philadelphia Academy of Sciences there is a specimen labelled "*S. Labradorica*, Schw., White Hills, N. H.—H. Little," but I cannot learn that the name was ever published. It shows, however, that at a very early day, the plant was known to occur in Labrador, a locality discredited by Andersson, but which is abundantly confirmed by recent collections.

The full and accurate description given by Andersson leaves little to be said in addition, and less by way of criticism. But as to the way the plant grows in its native habitat, the books have little to tell us. Mr. Carey groups it with *S. pedicellaris*, *S. Uva Ursi*, etc., as a "small shrub," which being evidently the sum total of information available to Andersson, is rendered "*Fruticulus non altus*." I mention this only that the average reader may appreciate the originality of Mr. Faxon's observations. He remarks "*S. argyrocarpa* seems to me to be much more restricted in its range in the White Mountains than *S. phylicifolia*. In

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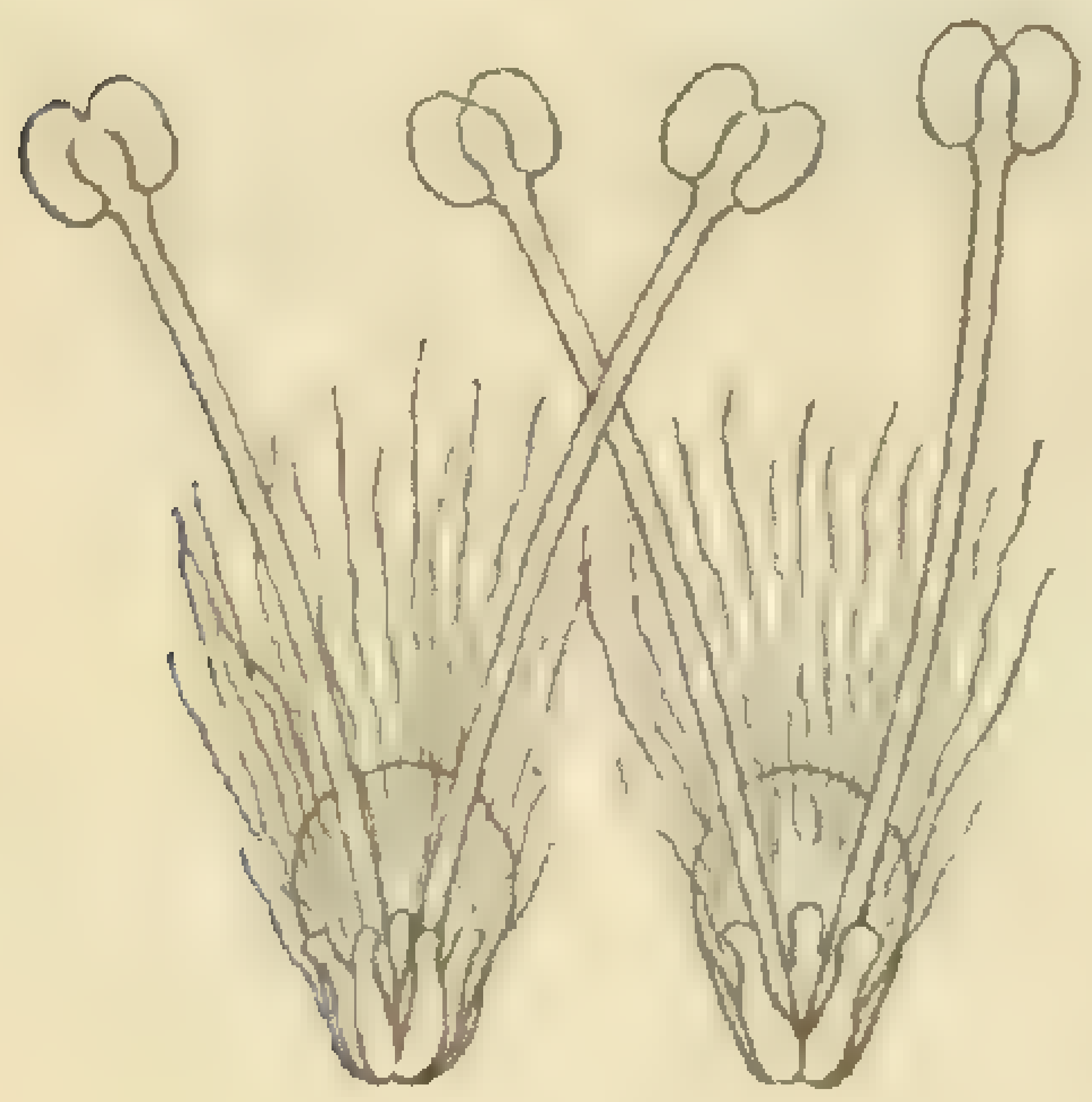
**Note*.—Concerning the general character of the White Mountain *S. phylicifolia*, my remarks were unguarded and do not fairly state the amount of actual divergence from the Old World type. While I do not wish to qualify in the least what was said of the closeness of resemblance observed between some of Mr. Faxon's specimens and certain others of genuine *phylicifolia* from Lapland, it is nevertheless true that from the common meeting ground thus indicated, the European forms vary mainly in the direction of *S. nigricans*, *S. caprea*, etc., whereas in this country the variation is in the direction of *S. chlorophylla*, and hence in so far as any difference appears in a series of specimens, it is a difference marked by shorter pedicels, longer styles, and more slender aments. I intended my closing words to cover this, but was not sufficiently explicit.

fact I only remember it as growing in the upper part of Tuckerman's Ravine in a quite limited area, a little in the Alpine Garden and a pretty large area about the Lake of the Clouds—all on or near Mount Washington. It is upright or bushy-branched throughout, growing in wide, dense patches, one and one-half to two and one-half feet high, frequently depressed at base. It is much smaller and less irregular in form than the *S. phylicifolia* with which it is usually associated."

The staminate plant seems to be rare and the few specimens which I have seen (with only a single exception) show aments that have been drenched by rains or injured by frosts. This scarcity of the male plant and its flowering at an unfavorable season, may account for the fact that perfectly fertilized pistillate aments are likewise rarely seen. Andersson says, "*capsulis vix ½ lin. longis*," showing that he was unacquainted with the fully developed capsule, which is 2-2½ lines long. The non-fertilized plant, with minute, silky-white capsules, is the form commonly seen in herbaria, and in fact so familiar do persons become with this and so accustomed to regard it as the ordinary state of the species, that I once had a specimen of fully developed aments sent me accompanied by a note calling my attention to the "abnormal fruit!" The figure (×8) represents the peculiar doubling of the gland in the male flower, first noticed by Mr. Carey.



Salix Uva Ursi, Pursh. (*S. Cutleri*, Tuck.)

This little willow is found on all the alpine summits of New England and New York, on Mt. Albert, Lower Canada, near the summit (*J. H. Allen*) and at the sea-level on the coast of Labrador. Mr. Faxon says of it, "extremely abundant over all the high summits of the White Mountains, from 4,000 ft. altitude upward. It is strictly prostrate and creeping, all the branches keeping near the surface of the earth and rocks, except in very sheltered situations, where the terminal shoots may bend upward to a height of 4 inches. It frequently creeps up and over stones, to which it seems to cling for warmth. From a stout central root it spreads in all directions (the branches for a short distance sending down rootlets into the ground) covering an irregular area of 1 to 2 feet in diameter. Sometimes it is inclined to grow mostly in one direction, when it may measure nearly two feet from root to tip: but always matted and flat."

This perfectly well characterized species was first named and described by Pursh; subsequently, for reasons to be discussed hereafter, Tuckerman rejected the original name, substituting for it his own *S. Cutleri;* Carey retained the old name, but Andersson adopted that of Tuckerman, and Dr. Gray, unfortunately, without due consideration followed him. On the page of the "Prodromus" where *S. Cutleri* appears there is a foot-note as follows: "It seems that the older name *Uva Ursi* ought to be preserved, A.DC." You may search in vain through the contributions to the same volume by such botanists as Regel, Parlatore, J. Muller and others, for any similar editorial criticism. In fact the very exceptional character of this protest by Alphonso De Candolle must be taken into account as a measure of the conviction which prompted it. After the appearance of the fifth edition of the Manual, I wrote to Dr. Gray expressing my regret at seeing *Uva Ursi* displaced and calling his attention to the trivial and invalid character of all the objections which had ever been raised against its retention. Doubtless the whole matter was a bore to him, but with that indulgence and helpfulness so characteristic of the man, he now took pains to acquaint himself with all that had been written on the subject and then replied: "I think the *facts are clear* that you must restore *Uva Ursi.* Andersson was *too loose* in respect to priority of names, and is not to be followed *blindly.*"

The reasons given by Andersson for rejecting the name *Uva Ursi* are as follows: 1, because the description given by Pursh is "very uncertain" and drawn from "cultivated specimens;" 2, "because if we respect this defective description there are many other very different species, from the White Mountains of New Hampshire and Labrador, that by the same rule must be granted also." Practically the whole question turns upon whether Pursh's description is, in reality, very uncertain and defective. My first impulse would be to arrange in parallel columns the original description and that given by Andersson, leaving the reader to make comparisons and judge for himself, but standing in wholesome dread of editorial curtailment, let it suffice to say, that when thus arranged two defects appear in the first—the leaves are said to be "obtuse" and the aments "lax." Admitting these inaccuracies, it may still be confidently claimed that Pursh limits, in no uncertain manner, a valid species. Indeed, for the day in which it was written, and considering the brevity which the author seeks to maintain throughout his work, the description is remarkable, not for its "uncertainties and defects," but on the contrary for the exact truthfulness with which minute characters are given, the importance of which was scarcely so fully recognized then as now. Two things may be said in extenuation of the defects mentioned above: first, that specimens are often found in which the leaves are all obtuse, or the aments loosely flowered; second, that such inaccuracies are very apt to occur in descriptions of new species, drawn from meagre and often incomplete specimens. Andersson himself described a *Salix Wrightii* of our southwestern States, as having "*amentis brevibus, densifloris, curvatis,*" but it now turns out that every one of these supposed characters represent nothing more than the individual peculiarities of the one tree from which Mr. Wright took his specimens. In its normal development *S. Wrightii* has rather long, loosely flowered aments, not at all curled up as they happen to be in No. 1877 coll. Wright. The remaining objections are without significance but since they have been raised ought not to be passed without comment. *S. Uva Ursi* was "described from cultivated specimens." But an objection of this sort does not stand in the way of Andersson's accepting *S. petiolaris*, Smith, which was not only described from cultivated specimens, but all that was known at the time of its origin was that it had been "sent to Mr. Crowe by Mr. Dickson as of British growth." It had gotten into Mr. Dickson's *Salicetum* nobody knew whence. Nay more, having united *S. petiolaris* "described from cultivated specimens," and *S. sericea*, Marshall, Andersson retained the former name for his aggregate species, although *S. sericea*, described from the indigenous plant, antidated the publication of *S. petiolaris* by seventeen years! The second objection is *mere talk*. *Salix Uva Ursi* is either a good species, capable of verification, or it is not. It does not affect the question in the least that something else may or may not share the same fate. "Every jug must stand on its own bottom." But in point of fact what other species is there of the White Mountains or Labrador which we must accept on the same grounds that we do *Uva Ursi?* Not one. True, by a process of elimination, the expert salicologist is led to believe that *S. planifolia*, Pursh, had it been as well described as *S. Uva Ursi*, would have anticipated *S. chlorophylla*, And.; but no one in the last fifty years has thought of identifying a species very obscurely described from leaves only.

Turning now to the objections urged by Professor Tuckerman, we find his argument to run like this: Hooker admits *S. Uva Ursi* doubtfully in his flora, while he enumerates *S. retusa* as belonging to our northern regions;"* Pursh gives no character which will distinguish his *S. Uva Ursi* from *S. retusa*, therefore *S. Uva Ursi* is *S. retusa*. Now, to begin with (and it will do to end with, for that matter) *S. retusa* has never been found in America; the plant so named by Hooker being an Arctic species of very different character, belonging in fact to a group having no representative in Europe. That while Andersson was willing to accept Tuckerman's name, he placed no value upon the argument by which its imposition was in the first place maintained, is shown by the fact that he flatly and without equivocation cites *S. Uva Ursi*, Pursh, under *S. Cutleri*, and not under the species to which is referred *S. retusa*, Hook! If the reader will think out for himself all that this implies, I need not say another word.

It was a happy thought of Prof. Tuckerman's to name this willow for Manassah Cutler, and if sentiment might be allowed to shake a "wavering balance" I would gladly see it adjusted in favor of *S. Cutleri*; but the balance does not waver, it sinks heavily with the weight of facts and authorities on the side of *S. Uva Ursi.*

Aphyllon fasciculatum in Montana.

Mr. E. R. Drew's "Notes on the Botany of Humboldt County, California," which formed so interesting a feature of the June number of the BULLETIN, contained a few remarks on the tendency of *Aphyllon fasciculatum*, to vary in the direction of *A. uniflorum.*

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*Silliman's Journ. XLV.—p. 36.

In Montana three species occur, the two mentioned and *A. Ludovicianum.* The last, with *A. fasciculatum*, is abundant everywhere, but more particularly in rocky or gravelly places on high, bare hills. *A. fasciculatum* is said to occur on *Artemisia* and some other plants, but I have never been able to prove this satisfactorily to myself and the task has seemed more hopeless from the fact that I have frequently found specimens of this plant growing in soil where not even grass roots were present, and have repeatedly dug specimens up with care in order to "get at the root of the matter." I mention grass roots because the variety *luteum*, Gray, of this species is said to infest the roots of grasses. I have not yet found this variety in Montana, but no doubt it occurs here. It was first discovered in Wyoming by Dr. Parry. *A. uniflorum*, is our rarest species unless indeed it and *A. fasciculatum* so perfectly intergrade as to be indistinguishable on the border line; I have on many occasions collected forms of the latter that I could only identify by a careful comparison with eastern and western specimens of the two species. But one apparently constant feature is to be observed; it is that the only typical specimens of *A. uniflorum* here seem to grow in damp thickets or along the borders of copses. In similar situations true specimens of *A. fasciculatum* may also be found, as well as upon the open plains and dry rocky hills; but the other forms of *A. fasciculatum* are seldom found except on the hills and plains.

The typical form of the variation from the *fasciculatum* type (if I may so express it) has flowers almost as in *A. uniflorum*, perhaps a trifle longer, slightly tinged with purple, yet as clearly yellowish tinged; the stem shorter than in typical *A. fasciculatum*, but as long again as in typical *A. uniflorum* and it has three or four peduncles, (generally four) usually longer than in typical *A. fasciculatum*, but considerably shorter than in typical *A. uniflorum.* From this general type, which is as evident and as common here as the typical *A. fasciculatum*, the plant varies and merges into *A. fasciculatum* on the one hand and almost, if not quite, merges into *A. uniflorum* on the other. For the past six years I have observed these points in this and other parts of Montana. Last autumn having occasion to cross the main range and go down as far as the Wyoming line, at the southwest, I observed the same distinct and intergrading forms all along the route.

F. W. ANDERSON.

GREAT FALLS, MONTANA, June 15, 1889.

Notes from the Phillippine Islands.*

"I made a very interesting trip a few days ago into the mountains of Megros, near the southern end. We passed over a range about 3,500 feet above the sea, and found a great change, of course, in the flora. At the height of a thousand feet we found a *Rubus*—rather like a great raspberry—edible, but not excellent in flavor. We soon after (at 1,200 feet) struck fine tree ferns. At 2,000 feet we found an East Indian pitcher plant, *perhaps* a new one. I was fortunate enough to get it in flower. Some of the larger pitchers held a pint. They continued abundant to the top of the mountains, climbing up the trees to a considerable height. After this height, (2,000 feet), ferns and mosses were in great abundance, draping the trees heavily. We also found a number of species of Begonias, one a beautiful spotted leaved one along the path, and a strong, spiny one in the narrow valleys of the streams. I afterwards found a third species near the coast. At 2,500 feet in the valleys of the streams I found a *Colias* in flower and showing tinted leaves, far from cultivation—it may be the original of our cultivated varieties. The natives called it medicinal and carried a lot of the plants with them. Large numbers of scrubby oaks grew on the crests of the ridges. The mountains were volcanic and very steep, and we had great difficulty in making our way over them. Large quantities of the finest rattans were found, but the guides said it was too far away to make collecting it profitable. The long, lash-like ends of the leaves, thickly set with recurved spines, meet us at every step, and a little lack of care brought a whole line of these hooks about our backs or faces and through our clothing. With all these inconveniences, I think a botanist would have gone half wild with delight over the plants. These central islands would seem to be a centre also for *Begonias*, as I have already stated, and for the *Convolvuli* which are found near the sea level. They are in great abundance of species, of various colors and sizes of flowers. The natives of the country show a little taste for the beautiful in small patches of flowers near their dwellings, but the flowers are usually marigolds, single balsams and everlastings, with now and then some showy malvaceæ. Rice forms the principal food plant, but in these central islands of light soils, Indian corn, Hungarian grass or something much like it, and Sorghum are much raised. Cotton is also cultivated, of three species, one native, one from China, and the other the one found among the Indians of South America, and probably brought over from there by the Spaniards. Coffee and cocoa are also cultivated since the fall in the price of sugar has made its cultivation unprofitable."

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*Extracts from a letter of Prof. Sture to Prof. A. A. Crozier, dated Cohn, Phillippines, March 12, 1889. Communicated by Dr. Geo. Vasey.

Carex umbellata, Schkuhr.

NOTES ON CAREX. XII.

It often happens that the limits of well known species are determined by herbarium specimens rather than by the plants as they grow. Fragments and imperfect specimens are inexcusable when the plant grows at our doors. Even *Carex umbellata*, well known from the time Muhlenberg began his studies of our sedges at the close of the last century, has not yet been clearly defined. Nor does the present writer assume to make a complete characterization in this note, but rather to designate two common forms of the species. It has never been possible to arrive at definite conclusions from the scrappy materials of herbaria, but this year I have had the privilege of seeing the two forms growing in profusion. Briefly stated, the two forms are these: 1. A very low and compact form with the spikes all closely clustered near the surface of the ground; 2. A looser and taller form with many of the peduncles elongated, and becoming true culms. Muhlenberg collected the former plant and sent it to Willdenow. It was divided with Schkuhr, who named it *Carex umbellata*, figuring it in his Riedgräser. Specimens are now to be seen in Schkuhr's herbarium at Halle, and Willdenow's at Berlin. It is not certain that the latter form has been named, although I propose to use

Dewey's var. *vicina* to designate it, inasmuch as his figure of this variety appears to represent the plant which I mean. I should not doubt the application of Dewey's name did he not make the following apology for its creation, evidently in order that he might forestall any disposition to erect it into specific rank: "As this variety is found growing on the same root with the other [the type], there can be no doubt about it"! This indicates that Professor Dewey intended to refer to those occasional specimens of true *C. umbellata* which produce one or two true culms. But his figure may be taken to indicate the plant in which the production of true culms is the habit, and by so understanding it the present writer avoids the necessity of making a new name for a well known thing. In truth, the two plants which are here designated are strongly characterized, but it is expected that there are intermediate forms, else they would be separated as species; so that it will be unnecessary to separate plants coming from the same root, either for the purpose of founding a new variety or of assuring the reader that the two plants really belong to the same species.

CAREX UMBELLATA, Schkuhr, Riedgr. Nachtr. 75, t. Www, f. 171, v.s., Hb. Schk.; Willd. Sp. Pl. iv. 290, v.s. Hb. Willd. Boott, Ill. t. 292.

Tufts small and dense (1 to 3 in. across); leaves short and often stiff (2 to 6 in. long); spikes all on separate scapes which do not exceed two inches in length, usually densely aggregated at the surface of the ground, or the staminate scape sometimes elevated an inch or so above the pistillate ones. Dry knolls and banks, New Jersey and Pennsylvania to New York (and New England?), and perhaps farther westward. The spikes are so much hidden in the leafy base of the tuft that the plant is probably not generally detected; hence the geographical limits of the species cannot be given with certainty.

Var. VICINA, Dewey, Sill. Journ. t. D. f. 13 (1826).

Tufts looser and larger; leaves longer (often a foot or more) and laxer, often broader; some pistillate spikes on scapes, but a part or most of them sessile or nearly so near the base of the staminate spike on a true culm which is from 3 to 8 inches high, one or two on each culm. With the species, and evidently further westward and northwestward. Although the two plants sometimes grow near each other here at Ithaca, they can be distinguished at a glance.

I am not aware that *Carex umbellata* or the var. *vicina* extend beyond the Mississippi in the United States. The plant referred to the species in my synopsis (Proc. Amer. Acad. Arts and Sci. xxii. 125) from Oregon, *Henderson* (the collector should have been given as *Howell*) is *C. deflexa* var. *Boottii*, Bailey. Some of the varieties of *C. deflexa* are very near *C. umbellata* var. *vicina*, but they are distinguished, among other things, by the leafy bracts and the more uniformly peduncled spikes.

L. H. BAILEY.

Notes on Two Rhododendrons.

RHODODENDRON CANESCENS (Michx.), (*Azalea canescens*, Michx. Fl. 1. p. 150 (1803); Pursh, Fl. 1. p. 152 (1814).—In his Synoptical Flora Dr. Gray has merged this old plant of Michaux into *R. nudiflorum*, but it surely has characters enough to enable it to hold a rightful place between that species and *R. calendulaceum.* In fact it is more nearly allied to the latter, from which it differs in its smaller corolla, of a bright rose color, with shorter tube, less ample and spreading limb, and slender, less exserted stamens. The corollas externally are clothed, as well as the peduncles, with short, gland-tipped hairs, not viscid to the touch; calyx-teeth minute, or sometimes one or two of them conspicuous and oval or oblong in shape; leaves roundish-obovate, or narrower and almost elliptical, pale, softly tomentose-pubescent beneath, less so above, or in some cases glabrate, except the margins, mid rib and veins. In favorable situations it attains the height of 10 to 12 feet.

From *R. nudiflorum* it is distinguished in the corolla by its color, peculiar fragrance, shorter tube, narrowed toward the base and beset with short gland-tipped hairs, and more equal divisions of the limb, and by the pale hue of the tomentose-pubescent leaves, and a more erect habit of growth. As in *R. nudiflorum*, the flowers appear both before and with the leaves.

First collected by Michaux "on rivulets in South Carolina," and later by Pursh in the mountains near "Cacopoon (Capon ?)

Springs, Va.," it ranges along the eastern slope of the Appalachians from Northern Alabama to the plateau of the Pocono in Monroe County, Penn., where, at an elevation of over 2,000 feet or more, it flourishes in great abundance. Dr. Britton reports its existence also in the Catskills of New York.

RHODODENDRON ARBORESCENS (Pursh), Torrey.—This rare species has lately been found and collected by Mr. John K. Small of Lancaster, Pa., an indefatigable young botanist, on the Blue Mountain above Harrisburg, at the same station probably, where it was long ago obtained by Bartram and Pursh.

THOMAS C. PORTER.

EASTON, PA.

New Californian Plants.

BY J. G. LEMMON.

DRABA CROCKERI, n. sp.

Sub-alpine, cæspitose, not at all stellate-pubescent, but sparingly pilose throughout. Leaves approximate and rosulate near the bases of the numerous branches, linear, about ½ inch long, one-nerved at base, slightly narrowed to the petiole; peduncles scapose, ½ to 1 inch high, 5 to 8 flowered; flowers small, white 2 to 3 lines long; stamens included; pods ovate, on pedicels 2 to 3 lines long and tapering into the long (1 to 2 lin.) incurved and persistent style; seeds 2 to 4, large, brown, wingless.

Sierra Valley, Sierra County, California, at an elevation of 3,600 feet, growing among Artemisia bushes and bunch grass, on sub-alkaline soil. Stems numerous, about three inches long, from a stout, vertical, perennial root. A very distinct species near § Aizopsis, DC., of Watson's recent "Revision of *Draba*," (Proc. Am. Acad. Sci., May, 1888), but peculiar in its scapose peduncles and simple pilose pubescence instead of the stellate hairs usually clothing the plants of this genus. Dedicated to Charles F. Crocker, of San Francisco, Vice-President S. P. R. R. Co., a gentleman distinguished for his patronage of science. Collected May 18, 1889.

POTENTILLA (HORKELIA) CONGESTA (Hook.), Baillon, var. LOBATA, n. var.

Floral and fruit characters nearly as in the typical form, inhabiting the Willamette Valley of Oregon, but the plants are glandular pubescent or scabrous throughout, and the leaflets are not merely "incised towards the apex," (Bot. Calif. p. 181), but they are deeply and equally cut-lobed nearly or quite to the base into 2 to 5 parts; also the stipules are larger in outline and more deeply fimbriated into filiform segments.

Among the rounded stones of a moraine in Shasta Valley, near Edgewood, June 28, 1889.

NAMA DENSA, n. sp.

Depressed, dense-leaved and hispid throughout, with white hairs. Leaves lanceolate-linear, less than ½ inch long, obtuse, one-nerved, mostly approximate at the ends of the short branches, the scattered lower ones narrowed to petioles; flowers in the axils, sessile, sepals linear, not thickened upward; corolla very small, tubular, about a line long, with minute lobes roseate, and caducous; filaments very slender inserted about midway of the tube, anthers very small; capsule oblong, corrugated, 12 to 16 seeded; seeds very small, distinctly rugulose.

Near Edgewood, Shasta Valley, North California, on loose volcanic soil. Forms hemispherical, dense mats two inches high and four inches across. It is in the section with *N. hispidum* and *N. demissum* of Gray's Syn. Flora of North America, but abundantly distinguished by its depressed, dense habit, its smaller flowers and seeds. June 28, 1889.

Reviews of Foreign Literature.

Durchbrechung der zellwand in ihren Beziehungen zur Ortsbewegung der Bacillariaceen. Von Otto Müller (Berichte der Deutschen Bot. Gesellschaft, Heft 4, 1889).

The motion of diatoms in water has long attracted the attention of those conversant with the habits of these peculiar little organisms. There are, at present, two theories held in respect to the motion, called in German, "Ortsbewegung," or motion from place to place. The first is called the osmotic, the second, the protoplasmic theory. The first accounts for the motion by the impulse given the cell by taking in and throwing out water, according to the supposed chemical changes taking place within the cell; the second, by the impulse caused by the motion of protoplasmic threads which reach the surface of the diatom through small pores in the wall.

The author of the above named article holds the latter view, and claims to have answered the two principal objections which the believers in the osmotic theory raise against it. These objections are, first, that no protoplasm has ever been discovered on the surface of the cell wall. Second, that the existence of pores of such character as to allow such an exudation has never yet been satisfactorily proven.

The latter objection, he claims, can no longer be urged against the forms he studied, the genus *Navicula*, chiefly the group Pinnularia. He gives a long and concise description of the anatomy of several forms, in which winding canals along the raphe are of such shape and size as to render it possible for the protoplasm to be pressed out to the surface, and at the same time prevented from escaping by a complicated arrangement of these tubes, so that if a quantity of protoplasm is pressed out at the central openings, a corresponding amount is taken up by suction at the ends of the cell, or vice versa, according to the action of the forces within which press the protoplasm outward. In this way a rotary motion of protoplasm may be kept up on the surface of the cell so that a small portion of the same is exposed to external contact.

He does not claim to demonstrate "ad oculos" the actual appearance of plasma on this surface in any other way than has already been done by previous investigators, that is, by the gliding along of foreign bodies on these parts of the cell. But he does claim to have proven the existence of the pores, and also that certain conditions exist inside the cell wall which must have for a result the forcing out of a small portion of the protoplasma through these channels. This is shown by the action of various reagents on the living protoplasm within the wall, by which the presence of a certain amount of turgor is proven. He states that this question of turgor has never before been directly answered in botanical literature. By the use of a ten per cent. solution of potassium nitrate a complete cessation of motion was produced, but no plasmolysis; on the application of fifteen per cent. the first indications of plasmolyses occurred, which increased with the increasing strength of the reagent.

From these experiments the author concludes, first, that the cause of motion cannot be osmotic, because the reagent which at once stops the motion from place to place, increases the action of the osmotic force. Second, that the fact of plasmolysis occurring only after a certain strength of solution is used proves the existence of a turgor pressure, which, reckoned according to de Vries, equals that of from four to five atmospheres. Therefore, if pores exist with inner openings in contact with the contents, the pressure within must cause the forcing out of a part of these contents sufficient in quantity to account for the motion of the diatom.

He speaks here of the question whether the motion is a free swimming one, that is, independent of the position of the cell, or as some claim, a creeping one, such that a certain position of the cell in relation to some fixed substance must be maintained. He says the first kind of motion may easily be proven, but that this does not preclude the possibility of the latter. The greater number of species examined by him live in slimy water where they can easily find fixed substances, but even in the so-called creeping motion there was nothing amoeba-like to be discovered.

In connection with the use of certain reagents producing a plasmolytic condition, a very rapid increase in oil was noticed in the contents of the cell. This increase also occurs in cultures which are becoming old, but here the process is much slower. He conjectures from this fact that the rotation of the protoplasm on the surface of the wall may be the means by which the plant gets its necessary supply of oxygen. He give this, however, merely as a hypothesis which requires further experiments.

E. L. G.

The Walls of suberous Cells.—In a recent number of the "Botanisches Centralblatt" is a short review of a long article by C. von Wisselingh on the walls of the suberous cells. This article appeared some months ago in the Archives Néerlandaises, in which the author gives the results of a long series of chemical tests as to the nature of the substance known as suberin. The author claims that in membranes containing suberin, wax is of much more frequent occurrence than has hitherto been supposed. On the other hand, the suberous lamellæ contain no cellulose whatever, and, in this respect, differ from the cuticularized layers. This is in direct contradiction to the results of von Hoehnel, who holds that in all suberous lamellæ some cellulose may be found.

Von Wisselingh says that on warming the cork lamellæ in glycerine, thus freeing the suberine, no cellulose can be discovered in the residuum. After treating these lamellæ with chromic acid, or warming in caustic potash, then adding chlor-iodide of zinc, they take a violet color. He says the principal constituents of cork lamellæ are certain chemical compounds which are very like essential oils in their nature, and which, taken together, may be termed suberin. The substance known as cutin is very like this in its reactions, but is not identical with it. The different compounds of which suberin consists are quite different in respect to their action, when treated with caustic potash or other strong reagents. For example, after a long treatment with such reagents, by pressing lightly on the cover-glass, the lamellæ break up into small round bodies, which he says consists of suberin, so also the substance which held these together in the lamellæ, but which has now been dissolved out by the action of the reagents; in case potash has been used, soap is formed. The leaf-like structure of the cork lamellæ, he claims, may be seen from the fact that the soluble substance which in its normal condition serves to hold the little round bodies together, may be injured much more easily in the tangential than in the radial direction. E. L. G.

BERLIN, GERMANY, July 5, 1889.

Botanical Notes.

Cladosporium epibryum, Cooke and Massee (Grevillea, xvii. 761). This new species of fungus has been collected by Mr. J. B. Leiberg on capsules of *Leersia rhabdocarpa*, *Bartramia pomiformis*, *Grimmia Donii*, and *Ptychomitrium Gardneri* from Idaho; it also occurs on Macoun's No. 84 of Canadian Mosses, *Grimmia ovata* and infested all my specimens of *Ulota phyllantha* collected by Thos. Howell. In fact this was the cause of the delay in publishing the description and figures of the fruit of this species, as the capsules were encircled by a series of black horns which also disfigured the base and the operculum, while the teeth were matted together by the mycelial threads. M. Cardot had more perfect material and I am glad to have learned that his discovery was quite independent of mine and his manuscript sent to the Revue Bryoligique before the receipt of my letter. I make this tardy acknowledgment.

Prof. Cooke (in litt.) also reports a species new to North America; *Leptosphæria bryophila*, Sacc. on *Campothecium Nuttallii* also collected by J. B. Leiberg.

E. G. BRITTON.

Botanical Exploration of Asia Minor. Prof. Joseph Bornmueller, Director of the Botanical Garden at Belgrav, Servia, and one of our most successful explorers, is on a twelve months journey through the eastern parts of Asia Minor, starting from Amasia and going up the Kisil Irmak to the Euphrates and Ak-dagh. Only once, thirty-five years ago, the Russian botanist Wiedemann, from St. Petersburg, traveled hastily over this country, and it never since has been visited. A long journey through Dalmatia, Montenegro, Greece, Turkey and Bulgaria enables Prof. Bornmueller to go to his work with experience, and success will be his. Prof. Haussknecht in Weimar will take charge of the original collection and work it up scientifically. Many herbaria and collections have extended large orders to Mr. Bornmueller, and orders for only first class prepared specimens for this country will be taken and forwarded through Mr. Geo. Hansen, Supt. Agr. Exp. Station, Jackson, Amador County, Cal. All the more common Mediterranean plants of course will be excluded.

The usual meetings of the Botanical Club of the American Association for the Advancement of Science will be held at nine o'clock in the morning of each day during the coming session at Toronto, Canada, beginning August 27th and continuing one week. The Secretary, Prof. Douglas H. Campbell, requests that members communicate to him at 91 Alfred Street, Detroit, Mich., titles of papers or memoranda of notes to be presented, as long as possible in advance of the meeting. A large attendance of botanists is confidently expected.

Recent advices from Dr. Thos. Morong report a continuance of his successful work in the exploration of the Paraguayan Flora. His headquarters for the present winter are at the city of Ascuncion, Paraguay, where letters addressed to him in the care of the United States Consul should reach him in due time.

The Bark of Pogonopus febrifugus has been introduced into England as a "False Cinchona." It is known in Bolivia as *Quina Morada* (Red Quina), and is used in the same way as Peruvian bark. According to Ss. Arata and Canzonari it contains an alkaloid which they name "moradeine." H. H. R.

Index to Recent American Botanical Literature.

Æchmea Skinneri, Baker. J. G. Baker (Hook. Ic. Pl. t. 1851). Native of Guatemala.

Agave dasylirioides. (Gard. Chron. v. 804, Fig. 128).

Anhalonium Lewinii, n. sp. P. Henning. (Gartenflora, xxxvii. 410, f. 92).

Descriptions in Latin and German, with a fine illustration of this species as well as of *A. Williamsii*, Lem.

Aristolochia ridicula. N. E. Brown. (Gartenflora, xxxvii. 124, f. 30).

Aster ptarmicoides var. lutescens. E. J. Hill. (Bot. Gaz. xiv. 153, 154).

Authorities—As to the Citation of. Roscoe Pound. (Am. Nat. xxiii. 161–163).

A plea for the use of the parenthesis in citing the author of a specific name, with the name of the author of the combination outside.

Canadian Spruces. Geo. Lawson. (Proc. Can. Inst. vi. 169-180).

A description and criticism of the three species, *Picea alba*, *P. nigra* and *P. rubra.*

Catalpa—A Hybrid. C. S. S. (Garden and Forest, ii. 303, 304; illustrated).

A description and representation of a supposed hybrid between *C. Kæmpferi* and either *C. bignonioides* or *C. speciosa.*

Cattlaya labiata, var. magnifica und Quesnelia Wittmackiana. E. Regel. (Gartenflora, t. 1281).

Colorado—Alpine Flowers of. Mrs. G. W. Thacher. (Appalachia, v. 284–291).

Containing a partial list of the alpine flowers found on Pike's Peak, Long's Peak, Table Mountain, and Mummy Mountain, during the summers of 1887, 1888.

Coreopsis—Achenia of. J. N. Rose. (Bot. Gaz. xiv. 145–151).

Diatom Marshes and Diatom Beds of the Yellowstone National Park. Walter H. Weed. (Bot. Gaz. xiv. 117–120).

Eichhornia crassipes (*Mart.*), *Solms.* E. Wittmack and F. Weber. (Gartenflora, t. 1271).

Eschscholtzia Californica. H. H. Rusby. (Reprint from Drug. Bull. June, 1889, pp. 8, with colored plate).

This species is of special importance to the druggist from the fact that morphine is said to have been recently detected in it. The author calls attention to the necessity of determining whether this is a characteristic of the typical species only, or of the many other closely allied species and varieties, which have been the source of so much discussion, and which have caused so many rearrangements of the genus.

Eschscholtzia Californica.—Bibliographical Notes on its Chemistry, etc. G. Suttie. (Druggists' Bulletin, 1889, 172).

Eschscholtzia Californica.—Preliminary Note on the Histology of. Prof. Joseph Schrenk. Illustrated. (Druggists' Bulletin, 1889, 179).

Eulophia maculata. B. Stein. (Gartenflora, t. 1285).

Fabiana imbricata, R. and P. (Pichi.) M. Rockwell. With illustration of microscopical structure. (Read before the Am. Phar. Ass'n, at the San Francisco meeting, 1889).

Flora Ottawaensis. H. M. Ami. (Ottawa Nat. iii. 4).

This installment begins with *Senecio aureus* and terminates with *Andromeda Polifolia.*

Flowers and Insects. I. Chas. Robertson. (Bot. Gaz. xiv. 120-126).

Observations by the author upon the insects noted on *Delphinium tricorne, Nymphæa advena, Castalia tuberosa, C. odorata, and Diclytra Cucullaria.*

Fossil Fishes and Fossil Plants of the Triassic Rocks of New Jersey and the Connecticut Valley. J. S. Newberry. (U. S. Geol. Survey, Monograph xiv. 4to, pp. 95, 26 plates, Washington, 1888).

The new species of plants described and figured are *Dendrophycus Triassicus, Pachyphyllum simile, P. brevifolium, Cycadinocarpus Chapini and Loperia simplex.* A list of other species detected is given.

Frühlings vegetation von Colima in Chile. A. R. Philippi. (Gartenflora, 1888, 152-154).

Fungi Guaranitici. Ch. Spegazzini. (Rev. Mycol. xi. 110 and 157).

An enumeration with collection numbers and habitats of species from Paraguay. Several new genera and species are described.

Gentiana calycosa. E. Regel. (Gartenflora, t. 1270).

Histology of the Leaf of Taxodium. II. Stanley Coulter. (Bot. Gaz. xiv. 101-107, Pl. XI).

Iowa—Notes on the Flora of. A. S. Hitchcock. (Bot. Gaz. xiv. 127-129).

Lactuca Scariola. E. J. Hill. (Bot. Gaz. xiv. 153).

Note of its establishment in the vicinity of Chicago.

List of Plants from Lower California sent to the Smithsonian Institution by Lieut. Chas. F. Pond, U. S. Navy. Geo. Vasey. (Proc. U. S. Nat. Mus. 1888, 368).

From collections made in Cedros and San Bonito Islds., recently worked up by Prof. Greene.

Loco Weed. Prof. L. E. Sayre. (Sixth Biennial Report of the State Board of Agriculture, Kansas, part second, 147–151).

From this paper we learn that about $200,000 has been expended by the State of Colorado in a wholly ineffectual attempt to destroy these poisonous plants.

Loco Weeds. (Pharm. Rundsch. vii. 168, 169, illustrated.) Figures are given of *Astragalus mollissimus and Oxytropis Lamberti.*

Maqui (*Aristotelia Maqui*). Carl Ochsenius. (Botan. Centralblatt, xxxviii. 689-694; 721-727; 11 figures)

Medicinal Tree—A Native. (Mining and Sci. Press, lviii. 475; illustrated).

A short account and excellent representation of *Ilex Cassine.*

Mission Viticole en Amerique. P. Viala. (8vo. pp. 387, plates (chromolithographs). Coulet, Montpellier, France, and G. Masson, Paris).

This work embraces a monograph of the North American species of the genus *Vitis*—description, history, synonyms, variations of forms, geographical range, natural soils, culture and horticultural value; and the principal fungous and other diseases to which they are subject. An authorized translation of the work is being prepared for publication by Prof. F. Lamson Scribner.

Mosses of North America—New.—II. F. Renauld and J. Cardot. (Bot. Gaz. xiv. 91-100, Plates XII. XIII. and XIV).

Names too Nearly Alike—Of Generic and Specific. Roscoe Pound. (Am. Nat. xxiii. 163, 164).

Nostocacées hétérocystées contenues dans les principaux Herbiers de France—Revision des. Ed. Bornet et Ch. Flahault. (Ann. Sci. Nat. (VII.), iii. 323-381; iv. 343-373; v. 51-129; vii. 177-262.) Also abstract in Hedwigia, xxviii. 32-54).

Nützpflanzen Brasiliens. Theodor Peckolt. (Pharm. Rundsch. vii. 110-113, continued).

Oncidium Lietzei, var. aureo-maculatum. E. Regel. (Gartenflora, t. 1279).

Peronospora upon Cucumbers. Byron D. Halsted. (Bot. Gaz. xiv. 152).

Philodendron Andreanum. E. Regel. (Gartenflora, xxxvii. 155, f. 33).

Pines of California—The. James G. Steele. Paper read before the Am. Phar. Ass'n at San Francisco meeting, 1889.

This makes a little pamphlet of 18 pages, in which the descriptions are rather popular than botanical. It evinces a considerable familiarity with the subject and is very readable.

Poisonous Plants indigenous to California—On the. Hans Herman Behr, M.D. Paper read before the Am. Phar. Ass'n at the San Francisco meeting, 1889.

Among these plants are mentioned *Micrampeles* (which the writer calls *Megarrhiza*,) *Rhododendron occidentale*, *Sium cicutæfolium*, *Cicuta* and *Conium*, *Eremocarpus setiger*, *Hendecandra procumbens.*

Prairie Flowers.—I. II. W. Fream. (Bell's Weekly Messenger and Farmers' Journal, June 3d and June 10th, 1889).

Notes upon the flowers found in the prairie regions of Manitoba and the Northwest Territories of British America.

Preliminary List of the Flowering and Fern Plants of Lorain

County, Ohio. Albert A. Wright. Pamph. 8vo., pp. 30. Oberlin, 1889).

Priority—A Question Regarding the Application of the Laws of. Roscoe Pound. (Am Nat. xxiii. 163).

Report of the Commissioner of Agriculture, 1888.

The reports of the botanist and chief of the section of Vegetable Pathology are quite fully illustrated, as usual. The latter is noticed elsewhere. The former is mostly taken up with an account of the grasses of Montana. *Reimaria oligostachya, Paspalum vaginatum, P. distichum, Setaria viridis, Oplismenus setarius, Beckmannia erucæformis, Anthenantia rufa, Amphicarpum Purshii, Leersia Virginica, Poa andina* and *Agropyrum glaucum* are figured, also *Plantago Patagonica, Lygodesmia juncea* and *Solanum triflorum.*

Report of the Chief of the Section of Vegetable Pathology for the year 1888. B. T. Galloway. (Reprint from the Ann. Rept. Dep't Agric., 1888. Pamph. 8vo. pp. 404, nine plates and map, Washington, D. C., 1889).

Excellent illustrations are given, many of them colored, of *Phytophthora infestans, Macrosporium Solani, Monilia fructigena, Fusarium Solani, Cladosporium fulvum, Podosphæra oxycantha, Entomosporium maculatum, Cercospora rosæcola, Taphrina Pruni, Ræstelia Pirata, Gymnosporangium macropus, Septosporium Fuchelii, S. heterosporium, Phyllosticta acericola, Glæosporium nervisequum, and Melampsora Populini.*

Rusts—Sub-epidermal. H. L. Bolley. (Bot. Gaz. xiv. 139-144; plate XV).

Sensitive Stamens in Compositæ. Byron D. Halsted. (Bot. Gaz. xiv. 151, 152).

Sobralia leucoxantha. (Bot. Mag. Tab. 7058).

Solanum pensile. J. D. H. (Bot. Mag. Tab. 7062).

Sphæralcea Emoryi and Oxybaphus Californica. E. Regel. (Gartenflora, t. 1266).

Spirogyra—A Phase of Conjugation in. C. B. Atwell. (Bot. Gaz. xiv. 154).

Splachnum luteum, L. J. R. Vaizey. (Proc. Camb. Phil. Soc. vi. 302).

This last contribution of a promising young botanist, recently deceased, to the physiology of mosses will be read with interest. His conclusions are that the peculiar apophysis of this moss is homologous with the leaves and serves to keep the spore-sac supplied with water.

Staphylea—Beiträge zur Kenntniss der Gattung. H. Zabel. (Gartenflora, xxxvii. 498-504, 527-531; illustrated).

A review of the genus from a gardener's standpoint. A var. *pauciflora* of our *S. trifoliata* is proposed. Seven species are recognized.

Torreya Californica. (Gard. Chron. v. 800, figs. 126, 127).

Yucca baccata and Y. Treculeana. (Garden, xxxv. 585; illustrated).

Yucca Whipplei. (Garden, xxxv. 561; illustrated).

Winters Bark—An Investigation of the genuine. (Druggists' Bulletin, 1889, 140; reprinted).

A translation by Dr. Rusby of the paper of Ss. Arata and Canzonari indexed in our last.

Willows—Notes on North American. IV. M. S. Bebb. (Bot. Gaz. xiv. 115-117).

An interesting elucidation of the confusion in regard to *Salix arctica.* The author points out the fact that the specific name *arctica* belongs to the species described by Pallas in 1788, on account of priority, while the *S. arctica* of R. Brown, (1819,) was applied to a different species. Mr. Bebb rightly says: "It is to be regretted that a name grown so familiar as that of *S. arctica*, R. Br., must needs be disturbed; on the other hand, *the open fact of the priorty of S. arctica, Pall., cannot be ignored.* * * *" Having relegated the name *arctica* to Pallas' species, the name *S. Brownii* is proposed for the *arctica* of R. Brown.

Zizyphus Chloroxylon (L.), Oliv. D. Oliver. (Hook. Ic. Pl. t. 1862).

This important timber tree of Jamaica, called by Linnæus a *Laurus* and by Nees a *Ceanothus*, has recently been collected in the proper condition to enable Professor Oliver to refer it to its correct botanical alliance. It is known as "Cogwood" in its wild state.

Zygopetalum Wendlandi. H. G. Reichenbach. (Gartenflora, t. 1267).

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List of the North American Andropogoneæ.

Compiled from Prof. E. Hackel's Monograph of the Andropogoneæ in the Sixth Volume of De Candolle's "Monographiæ Phanerogamarum."

By F. Lamson Scribner.

IMPERATA BRASILIENSIS, Trin. (*Imperata caudata*, Chapm. So. Fl. Suppl. 668; *Syllepis Ruprechtii*, Fourn.)—Florida, (Chapman); Mexico (Galeotti 5678); Cuba, (Wright 3486). So. Am.

IMPERATA HOOKERI, Rupr. (*I. caudata*, Scribn. Bull. Torr. Club, ix. 86 non Trin.; *I. brevifolia*, Vasey l. c. xiii. 26).—Mexico, (E. Palmer 444 a, 1886); N. Mex., (Wright 2001); Texas, (Drummond 283, Havard); Arizona, (Pringle); California, (Parish Brothers, 1031).

IMPERATA EXALTATA, Brong. var. CAUDATA, Hack. (*I. caudata*, Trin.; *Syllepis polystachya*, Fourn.).—Mexico (ex Fourn.); So. Am.

SACCHARUM OFFICINARUM, Linn. Spec. ed. l. 54. sub-var. BREVIPEDICELLATUM, Hack. in Mart. et Eichl. Fl. Bras. ii. pars 3, 256, t. 59, f. 2.—Mexico, Brazil, etc.

SACCHARUM CAYENENESE, Benth. Journ. Linn. Soc. xix. 66, (*Eriochrysis Cayenensis*, Beauv.; Kunth En. Suppl. t. 38, f. 7). —Mexico, (Liebmann 1, 2).

ERIANTHUS SACCHAROIDES, Michx. (sens ampl.) (*Andropogon alopecuroides*, L. *Saccharum alopecuroideum*, Nutt.; *Erianthus saccharoides*, Michx. (sens str.); *E. giganteus*, Muhl.; *Spodiopogon foliatus*, Fourn.)—New Jersey, Illinois to Florida (Curtiss 3627) and westward to Louisiana and Texas (Vinzent 134); Mexico (Bourgeau 2970).

sub-spec. BREVIBARBIS, Hack. (*E. brevibarbis*, Michx.; *Saccharum brevibarbe*, Pers. Syn. i. 103?)—Georgia (ex Elliott); Carolina, (Curtis, Ravenel); Alabama, (Buckley); Arkansas (Engelmann).

sub-spec. CONTORTUS, Hack. (*E. contortus*, Ell.; *Sacch.*

contortum, Nutt. *Andropogon alopecuroides*, Muhl. Descr. 285 ?)—Florida, (Chapm.); So. Carol. (Ravenel); N. Carol. (Rugel); Ind. Terr. (Vasey).

ERIANTHUS TRINII, Hack. (*Saccharum giganteum*, Trin.; *Erianthus saccharoides*, var. *Trinii*, Hack. in Mart. et Eichl. Fl. Bras. ii. part 3, 258; *Spodiopogon vaginatus*, Fourn.?).

sub-var. GLABRINODES, Hack. l. c.—Mexico (Leibm. 39). So. Am.

ERIANTHUS STRICTUS, Baldw. (*Saccharum strictum*, Nutt.; *Pollinia dura*, Trin.; *Andropogon durus*, Steud.).—Florida, (Gray); Virginia (Rugel); Tennessee (Gattinger, Curtiss 3629); Alabama (Schott); Texas, (Neally).

ISCHÆMUM LATIFOLIUM, Kunth. (*Andropogon diatherus*, Steud., *Ischaemopogon latifolius*, Griseb. Flor. West. Ind. 560).—Mexico (Schiede 953, Bourg. 2203, Leibm. 12.); So. Amer.

EREMOCHLOA LEERSIOIDES, Hack. (*Ischæmum leersioides*, Munro in Proc. Amer. Acad. iv. 363; Thurber in S. Wats. Bot. Calif. ii. 262).—Note: *Eremochloë*, S. Watson in Bot. King Exped. p. 382 (1871) belongs to the Festuceæ. *Eremochloa* of Büse in Pl. Jungh. i. 357, antedates by many years that of Watson, and Hackel has changed the latter to *Blepharidachne*—*B. Kingii* and *B. Bigelovii*, Hack.=*E. Kingii* and *E. Bigelovii*, S. Watson.

ROTTBŒLLIA COMPRESSA, L., var. FASCICULATA, Hack. (*R. fasciculata*, Lam.; *Hemarthria fasciculata*, Kunth.; *H. caudiculata*, Steud.).—Mexico (Fourn); Texas, near Laredo (Havard).

ROTTBŒLLIA CYLINDRICA, Torr. (Bot. Whippl. Expd. 103), Chapm. So. Fl. 579, *Tripsacum cylindricum*, Michx. Fl. Bor. Am. i. 60).—Florida (Michx., Chapm.); Louisiana (Drummond 362); Texas (Hall 843, C. Wright); Arkansas (Engelmann); Indian Territory (Palmer 400).

ROTTBŒLLIA RUGOSA, Nutt. Gen. i. 84.—Maryland (Commons); Delaware (Canby); N. Carolina (Curtis); Georgia (ex Nuttall);

var. CHAPMANI, Hack. (*R. rugosa*, Chapm. So. Flor. 579).—Florida (Chapm., Curtiss 3622).

ROTTBŒLLIA CORRUGATA, Baldw. in Sill. Journn. i. (1819), 355. (*R. tesselata*, Steud. Synop. i. 362).—Georgia (ex Baldw.); Florida (ex Chapm.); Alabama (Mohr); Louisiana (Riehl).

var. AREOLATA, Hack. Low damp pines near Mobile (Mohr).

ROTTBŒLLIA AURITA, Steud. Synop. i. 361. Sub-spec. STIGMOSA, Hack. (*R. stigmosa*, Trin. *Apogonia ramosa*, Fourn. Pl. Mex. ii. 63).—Mexico, (Bourg. 2647, Liebm. 116); United States (ex Fourn.).

MANISURUS GRANULARIS, L. fil. Nov. Gram. Gen. (1779) 37. fig. 4-7. (*Cenchrus granularis*, L. *Manisurus polystachya*, Beauv., Fl. Ow. et Ben. t. 14).—Mexico (Schaffner 112, 131, etc). Arizona (Pringle); Louisiana, Carolina (Bosc). Distributed throughout the tropical and sub-tropical regions of the world.

TRACHYPOGON POLYMORPHUS, Hack. in Mart. et Eichl. Fl. Bras. ii. pars 3, 263.

var. CANESCENS, Hack l. c. (*T. canescens*, Nees; *Andropogon canescens*, Kunth).—Mexico (ex Fourn. Pl. Mex. ii. 65).

var. MONTUFARI Hack. l. c. *Andropogon Montufari*, Kunth in Humb. et Bonpl. Nov. Gen. i. 184; *Andropogon stipoides*, Kunth, Enum. Pl. i. 487).—Mexico (Schiede, 936, Schaffner, 147).

sub-var. SECUNDUS, Hack. (*Trachypogon Montufari*, Nees.; *Andropogon secundus*, Kunth, Enum. Pl.i. 487).—Texas (Drummond 2. No. 342); Arizona (Pringle); Mexico (Palmer 303) (Bourgeau 3133, 3358); So. Am.

var. GOUINI, Hack. (*T. Gouini*, Fourn. Pl. Mex. ii. 66).—Mexico (Gouin).

var. PLUMOSUS, Hack. l. c. 265. (*Andropogon plumosus*, Humb. et Bonpl. in Willd. Spec. iv. 918. *Trachypogon plumosus*, Nees.).—Mexico (Liebm., Schaffner, 257); So. America.

var. DISSOLUTUS, Hack. (*Andropogon dissolutus*, Steud. Syn. i. 381; *Trachypogon Mülleri*, Fourn. Pl. Mex. ii. 66).—Mexico (Aschenborn, 663; Fr. Müller, 2085).

var. KARWINSKYI, Hack.—Mexico (Karwinsky).

ELIONURUS TRIPSACOIDES, Humb. et Bonpl. ap. Willd. Spec.

Pl. iv. 941. (*E. tripsacoides*, Kth. in Humb. et Bonpl. N. Gen. i. 192. t. 62; *Rottboellia ciliata*, Nutt. Gen. 1. 83; *Andropogon Nuttallii*, Chapm. So. Flor. 580).—Georgia (ex Nutt.); Florida (Curtiss, 3630); Louisiana (Drummond, 369); Texas (Drum., 344); Mexico (Schiede, 942).

var. CILIARIS, Hack. (*E. ciliaris*, Kunth in Humb. et Bonpl. N. Gen. i. 193, t. 63).—Mexico (Liebm. 610, Schaffn. 145, Bourg. 2844).

var. SERICEUS, Hack.—Mexico (Liebm. 656).

ELIONURUS BARBICULMIS, Hack.—W. Texas (Wright 804, ex p.); N. Mex. (Wright 2106); Arizona (Lemmon 2926, Rothrock 638).

ANDROPOGON BREVIFOLIUS, Sw. Prodr. fl. Ind. occ. 26. *A. debilis*, Kth.; *A. floridus*, Trin).—Mexico, (Schaffner, 109, etc.). Widely distributed in the tropical, rarely subtropical regions.

ANDROPOGON MALACOSTACHYS, J. S. Presl, in C. B. Presl, Reliq. Haenk. i. 337.—Mexico (Hænke). *A. malacostachyum*, Fourn, belongs to *A. hirtiflorus*, Kth.

ANDROPOGON SEMIBERBIS, Kunth. (*A. vaginatus*, J. S. Presl). —Mexico (Hænke).

sub-var. *pruinatus*, Hack. (*A. tener*, Curtiss N. Am. Pl. 3633, non Kth.).—Florida (Curtiss).

ANDROPOGON HIRTIFLORUS, Kunth, Revis. Gram. ii. 569. t. 198.

var. OLIGOSTACHYUS, Hack. (*Andropogon oligostachyus*, Chapm.; *A. malacostachyus*, Fourn.).—Florida (Chapm.); Mexico (Schaffner 327); Arizona (Pringle).

var. FEENSIS, Hack. (*A Feensis*, Fourn.).—Mexico (Parry & Palmer 966 etc.); Arizona (Lemmon). Schaffner No. 327 is intermediate between one variety and the other.

ANDROPOGON MYOSURUS, J. S. Presl in C. B. Presl, Reliqu. Hænk. i. 337.—Mexico (Hænke); (Palmer 1886, No. 506).

ANDROPOGON CIRRATUS, Hack. in Flora, 1885, 119.—Western Texas (Wright 804 ex p. et 2105); N. Mex. (Greene). Allied to *A. tener*, Kth.

ANDROPOGON TENER, Kunth (sens. ampl.).—Florida (Chapm.); Alabama (Mohr); Louisiana (in Herb Trin.); Mexico (Palmer).

sub-var. SCABRIGLUMIS, Hack. — Mexico (Bourgeau 3134).

ANDROPOGON IMBERBIS, Hack. (*Flora*, 1885, 119, ampl.).

var. MUTICUS, Hack. (*Rottbœllia Salzmanni*, Trin., *Apogonia glabrata*, Fourn.).—Mexico (Liebm. 623, 712, Schaffn. 143, 268, Bourgeau, 2757).

ANDROPOGON SCHOTTII, Rupr.

sub-var. ASPERIGLUMIS, Hack.—Mexico (Palmer).

ANDROPOGON SCOPARIUS, Michx., (*A. scoparius*, Michx. sens str.; Vasey Agr. Grasses, t. 25; *A purpurascens*, Muhl.; *A dissitiflorus*, Trin. non Michx.). The forms or sub-varieties enumerated are 1, *typica;* 2, *flexilis* (*A. flexilis*, Bosc.); 3, *cæsia;* 4, *serpentina;* 5, *simplicior;* 6, *lolioides* (*A. lolioides*, Fourn.).—Eastern U. S. and west to the Saskatchewan and south to Texas, Mexico and Cuba.

sub-spec. MARITIMUS, Hack. (*A. maritimus*, Chapm. So. Flor. Suppl. 668).

var. DIVERGENS, Hack.—Texas.

ANDROPOGON CONDENSATUS, Kth. in Humb. et Bonpl. Nov. Gen. i. 188.

var. PANICULATUS, Hack. (*A. scoparius*, J. S. Presl. non Michx.; *A. paniculatus*, Kth.; *A. densus*, Desv. ex Fourn.; *A. Lhotzkyi*, Steud., Fourn. Pl. Mex. ii. 61.; *A. Lechleri*, Steud., *A. bicornis*, Benth. Pl. Hartw. 263, non L).—Mexico (Hænke, Schiede 938, Bourgeau 2646, Schaffn. 261, Fr. Müller 2032); So. Amer.

sub-var. EXSERENS, Hack.—Mexico (Karwinsky).

ANDROPOGON GRACILIS, Spreng.—South Florida (Garber); West Indies.

ANDROPOGON FASTIGIATUS, Sw. Prodr. 26.—Mexico (Palmer).

ANDROPOGON MACROURUS, Michx. (*A. macrourus*, Michx. sens. str.; Vasey Agric. Grasses, t. 26).—North America from N. Y. south to Florida and west to Texas and Southern California (Parish Brothers); Mexico (Palmer 446, 1886; Müller 2033; Liebm. 56); Guatemala (Friedrichsthal 1445); also in the West Indies.

var. ABBREVIATUS, Hack.—New Jersey (Gray); Carolina (Rugel).

var. HIRSUTIOR, Hack.—Alabama near Mobile (Mohr).

var. GLAUCOPSIS, Ell. (*A. glaucus*, Muhl.?).—S. Carolina (Elliott); Florida (Curtiss 3639^b).

ver. CORYMBOSUS, Chapm. ap. Curtiss exs.—Florida (Curtiss 3639^c).

ANDROPOGON VIRGINICUS, L. Spec. 1046, nec ed. 2; A. Gray! Man. ed. 5, 652 (Non *A. Virginicus*, Trin. nec Hack. in Mart. et Eichl. Flor. Bras.).

var. VIRIDIS, Hack. (*A. dissitiflorus*, Michx.; *A. Louisianæ*, Steud.; *Cinna lateralis*, Walter, Carol. 59).

sub-var. STENOPHYLLUS, Hack.–Florida (Chapm.); Alabama (Mohr.).

sub-var. DITIOR, Hack. (*A. macrourus*, var. *viridis*, Curtiss, N. Am. Pl. 3639^d).—Florida; Mexico (Schiede 937, Liebm. 72).

var. GLAUCUS, Curtiss, N. Am. Pl. No. 3638^b —Florida.

var. DEALBATUS, Mohr., Mss.—Alabama (Mohr).

var. TETRASTACHYUS, Hack. (*A. tetrastachyus*, Ell.; *A. Curtisianus*, Steud. Synop. i. 390).—Florida (Curtiss 3636); Georgia, Carolina, Alabama.

ANDROPOGON LIEBMANNI, Hack. in Flora 1885, 132, *A. macrothrix*, Fourn. Pl. Mex. ii. 60 (quoad Bourg. 2376) non Trin.). Mexico (Liebm. 590, Bourgeau 2376).

sub-var. RARIPILUS, Hack.—Mexico (Palmer 227, 1886).

sub-var. MOHRII, Hack.—Alabama (Mohr).

ANDROPOGON LONGIBERBIS, Hack. l. c. 131, (*A. tetrastachyus*, var. *distachyus*, Chapm. So. Fl.).—Florida (Garber).

ANDROPOGON ELLIOTTII, Chapm. So. Fl. 581, excl. syn.—Florida (Chapm.) Georgia, Carolina (ex Chapm.); Maryland (Commons); Delaware (Commons); Alabama (Mohr); Missouri et Arkansas (Engelmann, Riehl. No. 528).

var. GRACILIOR, Hack.—Florida (Curtiss 3636^a).

ANDROPOGON BRACHYSTACHYUS, Chapm. So. Flor. Suppl. 668. —Florida (Curtiss 3632).

ANDROPOGON ARCTATUS, Chapm. in Bot. Gaz. 1878, 20; So. Flor. Suppl. 668 (in part).—Florida (Chapman).

ANDROPOGON BICORNIS, L. Throughout tropical America, Mexico (Hartw. 521, Liebm. 60).

ANDROPOGON LEUCOSTACHYUS, Kunth. (*A. Virginicus*, Trin. *A. leucostachyus*, Kth. sens. str. *A. Virginicus*, L. Spec. ed. 2, 1482, ex parte, nec ed. 1; *A. lanuginosus*, Kth. *Euklastaxon tenuifolius*, Steud., *Andropogon Domingensis*, Fourn.).—Mexico (Schaffn. 3ª) So. Amer. and W. Ind.

ANDROPOGON ARGYREUS, Schult. Mant. ii. 450 (*A. argenteus*, Ell., *A. Muhlenbergianus*, Schult.).—Maryland, Delaware to Florida (Curtiss 3637) and west to Texas and Colorado (ex Wats.).

ANDROPOGON CABANISII, Hack. in Flora 1885, 133.—Pennsylvania and Florida (Cabanis in herb. Berol.); Florida (Chapm. mixt. mis. c. *A. arctato*).

ANDROPOGON BOURGAEI, Hack. in Flora 1885, 134.—Mexico (Bourgeau 2645, F. Müll. 1393 ex p.; Liebm. 505).

ANDROPOGON PROVINCIALIS, Lam. Encycl. Bot. i. 376 (*A. furcatus*, Muhl. ap. Willd.).

var. FURCATUS, Hack.—From New Brunswick to Florida, Texas, Colorado, Saskatchewan and Hudson's Bay.

var. LINDHEIMERI, Hack.—Texas (Lindheimer 741).

var. PYCNANTHUS, Hack.—Texas (Vinzent 69); New Mexico (Brandegee).

ANDROPOGON HALLII, Hack, in Sitzungsber. Ak. Wiss. Wien. 89 (1884) 127.—Arizona (Lemmon); Montana (Ward).

var. FLAVEOLUS, Hack. l. c.—Colorado (Hall and Harbor 651).

var. INCANESCENS, Hack. l. c.—Colorado (Hall and Harbor 651).

var. MUTICUS, Hack.—Colorado (Vasey).

ANDROPOGON WRIGHTII, Hack. in Flora 1885, 139.—New Mexico (C. Wright 2104).

ANDROPOGON HIRTIFOLIUS, J. S. Presl.—Mexico (*A. Schaffneri*, Griseb. ap. Fourn.). (Schaffner 126, 325, Liebm. 20, Hænke).

sub-var. PUBIFLORUS, Hack. (*A. pubiflorus*, Fourn.) (Schaffn. 165).

ANDROPOGON SACCHAROIDES, Sw. Prod. Fl. Ind. Occ. 26.—Mexico (Liebm. 528).

var. BARBINODIS, Hack. (*A. barbinodis*, Lag.; *A. argenteus*, DC.).—Mexico (Maivet in herb. DC., Liebm. 82).

var. TORREYANUS, Hack. (*A. glaucus*, Torr. in Ann. Lyc. N. Y. i. 157.; *A. Jamesii*, Torr. in Marcy's Rept. 302. *A. Torreyanus*, Steud. cfr. Scribner, Bull. Torrey Bot. Cl. ix. 52).--Texas (Reverchon, Curtiss 3635); Colorado (Brandegee); Arizona (Rusby).

var. SUBMUTICUS, Vasey Ms.—Texas (Neally).

var. LAGUROIDES, Hack. in Mart. et Eichl. Flor. Bras. ii. pars. 3, 293. (*A. laguroides*, DC.).—Mexico (Bourgeau 2969, Schaffn. 130, 319, Palmer); So. Amer.

sub-spec. LEUCOPOGON, Hack.—Mexico (Aschenborn 141, Schaffn. 31, 320, Berlandier 641 ex parte).

sub-var. PERFORATUS, Hack —Mexico (Bourgeau 674, 2374, Berlandier 641 ex p., Liebm. 87); Texas (Lindheimer 1161).

sub-var. PALMERI, Hack.—Mexico (Palmer 305, 1886 coll.)

ANDROPOGON SCHLUMBERGERI, Fourn. Pl. Mex. ii. 59.—Mexico (Fr. Müller 2016, Liebmann 18).

ANDROPOGON SORGHUM, Brot. Fl. Lus. i. 88 sens. ampl.

var. HALEPENSIS, Hack. sens. str. (*Sorghum halepense*, Pers.).

sub-var. LEIOSTACHYUS, Hack. Sub-spontaneous in the Southern United States, Mexico, Cuba, etc.

sub-spec. SATIVUS, Hack. [Includes cultivated varieties of Sorghum].

ANDROPOGON NUTANS, L. Spec. ed. i. 1045, non Mantissa 2. *Sorghum nutans*, A. Gray, Man. ed. 5, 652. A most polymorphous species.

var. AGROSTOIDES, Hack. (*Andropogon Francavilleanus*, Fourn. *Chrysopogon Francavilleanus*, Hemsley in Biol. Cent. Amer. iii. 530).—Mexico (Bourgeau 2871, Liebmann 713).

var. STIPOIDES, Hack. (*Androp. stipoides*, Kunth.; *A. Humboldtianus*, Steud.; *A. rufidulus*, Steud.; *Chrysopogon stipoides*, Benth. in Journ. Linn. Soc. xix. 73, non Trin.).—Mexico (Schiede).

var. AVENACEUS, Hack. (*A. avenaceus*, Michx.; *A. ciliatus*, Ell.; *Sorghum avenaceum*, Chapm.; *Chrysopogon* *avenaceus*, Benth.).—N. America, in nearly all the United States, especially southward, Mexico and south to Bolivia and Brazil.

var. LINNÆANUS, Hack. (*Sorghum nutans*, Chapm., *Chrysopogon nutans*, Benth.).—North Carolina to Florida (Chapm.); Texas (Reverchon); Mexico (Liebmann 25).

var. INCOMPLETUS, Hack. (*A. incompletus*, J. S. Presl; *A. Geleottii*, Fourn).—Mexico (Hænke; Liebm. 34; Bourgeau 3359; Müller 2082; Galeotti 5685; Palmer 590, coll. 1886).

var. SCABERRIMUS, Hack., sub-var. ELONGATUS, Hack. —Mexico (Palmer 511, coll. 1886).

ANDROPOGON UNILATERALIS, Hack. (*Sorghum secundum*, Chapm. So. Flor. 583).—Florida (Chapm., Curtiss 3644).

ANDROPOGON SQUARROSUS, L. fil. *Andropogon muricatus*, Retz.; *Vetiveria odorata*, Virey.—[Louisiana, spontaneous along the Mississippi (Langlois)].

ANDROPOGON PAUCIFLORUS, Hack. (*Sorghum pauciflorum*, Chapm. Bot. Gazette 1878. 20. So. Flor. Suppl. 668).—Florida (Chapman, Garber, Curtiss No. 3644^a).

ANDROPOGON MELANOCARPUS, Ell. Sk. i. 146. (*Heteropogon acuminatus*, Trin.; *H. Roylei* Nees in Steud. Synops. i. 367). —Florida (Curtiss N. Am. Pl. 3641); Georgia (Ellis); Mexico (Palmer); throughout the tropical zone.

ANDROPOGON CONTORTUS, L. (*Heteropogon hirtus*, Pers. *H. contortus*, R. & S.).—Arizona (Pringle); Mexico (Bourgeau 3199, 2374; Schaffn. 46 and 127).

sub-var. SECUNDUS, Hack. (*A. Allionii*, Kunth. in Humb. et Bonpl. N. Gen. i. 185. non DC.; *A. firmus*, Kth. Enum. i. 486).—Mexico (Bonpl., Hænke, Hartweg, 249).

ANDROPOGON BRACTEATUS, Willd. (*Cymbopogon foliosus*, R & S. *Hyparrhenia foliosa*, Fourn. Pl. Mex. ii. 67).—Mexico (Liebm. 46); and South America.

ANDROPOGON RUPRECHTI, Hack. (*A. anthistirioides*, Rupr.; *Hyparrhenia Ruprechti*, Fourn l. c.).—Mexico (Galeotti 5697; Liebm. 650; Palmer 513, coll. 1886); tropical Africa.

Proceedings of the Botanical Club A. A. A. S., Toronto Meeting, August 29th to September 3rd, 1889.

THURSDAY, AUGUST 29th.

The first meeting was held in the lecture room of the Biological Hall of the University of Toronto at 9 A. M., Prof. T. J. Burrill, Chairman, Dr. Douglas H. Campbell, Secretary.

Mr. Thos. Meehan read a paper on "The fertilization of *Hypericum Canadense*," maintaining that the plant is self-fertilized.

Dr. E. Lewis Sturtevant remarked that in the common pea (*Pisum sativum*) the pollen often meets the pistil before the flower opens, and that the English bean (*Faba vulgaris*) while blooming heavily at Geneva, N. Y., forms but few pods.

Hon. David F. Day stated that the Rose Acacia (*Robinia hispida*), while blooming freely in the vicinity of Buffalo, rarely produced pods, and he had observed that the anthers were commonly devoid of pollen.

Prof. Halsted stated that he had recently experimented on the common barberry (*Berberis vulgaris*) by covering a number of the racemes with paper bags, and in no case where the protection was complete were berries produced.

Mr. Coville said that in *Lupinus perennis* the pollen was often shed on the pistil before the latter was in a receptive condition.

Mr. Meehan read a paper on "The Cleistogamy of *Cerastium nutans*," which he had observed constant in many plants growing in the vicinity of Philadelphia, and that it was indicated in all the specimens contained in the Philadelphia Herbarium. His observations were confirmed by Judge Day and by Mr. C. F. Wheeler. Dr. Britton remarked on the frequency of apetaly in the Caryophylleæ. Mr. Coville stated that *Draba verna* is certainly cleistogamous in winter in the vicinity of Washington.

Prof. Halsted read a paper describing his detailed observations on the pollen of *Pontederia cordata*, containing the study begun by Mr. Wm. H. Leggett. Prof. Halstead described also the explosive dehiscence in the legumes of the bean known as *Phaseolus diversifolius*, stating that in the elastic coiling of the valves the seeds were expelled to a considerable distance. Dr. Britton remarked that this was a quite constant feature in the tropical species of the genus, as well as in some related genera;

also that this plant is certainly the *Phaseolus helvolus* of Linnæus, the species being incorrectly named in the manuals.

Mr. M. B. Waite described the elastic dehiscence of the pods of the several native species of *Viola*.

Dr. Britton exhibited and remarked on a number of additions to our native American flora.

Prof. Burrill exhibited a large collection of gelatine cultures of bacteria, prepared by Dr. Roswell Park of Buffalo.

In the afternoon the members participated in a field excursion at Scarborough Heights, tendered by the citizens of Toronto to the Section of Biology. This was an extremely enjoyable experience, and many interesting plants of the region were collected.

FRIDAY, AUGUST 30th.

Mr. F. V. Coville read a report of the work accomplished by the Botanical Division of the United States Department of Agriculture during the past year, and on motion, and unanimously carried, this report was referred to a committee consisting of the Chairman, Hon. D. F. Day and Professor Macoun, and this committee was requested to draw suitable resolutions expressive of the approbation of the Club.

Professor Macoun remarked on the present state of botanical work in Canada, dwelling especially on the extremely large collections brought together by himself and his colleagues during the past ten years, and offering to send to any specialist all the material at his command, on condition that it be critically examined and determined. He expressed his conviction that it is only by the work of investigators in limited fields of research that satisfactory results can be reached in the definition of the North American flora.

Dr. Britton exhibited specimens of a Siberian Labiate, *Elscholtzia cristata*, collected by Dr. John I. Northrop on the gravelly shore of Notre Dame du Lac, Termiscouata County, Quebec, in 1887 and again the present year, under conditions indicative of its naturalization at that point. He also remarked on the work of Dr. Thos. Morong in exploring the little known flora of Paraguay, stating that Dr. Morong was now on the upper waters on one of the larger rivers, prosecuting his researches under the most favorable circumstances. It was resolved that the compliments of the Club be tendered to Dr. Morong, together with a statement expressing its appreciation of his work, and the Chairman and Secretary were appointed a committee to draft such resolutions.

Professor W. J. Beal described his observations on the conjugation of *Mesocarpus pleurocarpus*.

Professor Burrill remarked on the germinating spores of the Ustilagineæ.

Dr. Douglas H. Campbell exhibited and remarked on chlorophyll in the embryo of *Celastrus scandens*, also detected by Professor Halsted. Dr. Britton alluded to his observation, already recorded, of chlorophyll in the pith of *Phoradendron flavescens*, and as a further illustration of the development of chlorophyll in but little light, stated that he had observed on one of the lower levels of the Dickinson Iron Mine, New Jersey, a vine of the lima bean, germinated and grown there by one of the workmen to the length of at least eight feet, and containing abundant chlorophyll. The vine was continuously exposed to candle light. Dr. Campbell described also his studies in the nuclear division of the mother-spores of the pollen grains in *Podophyllum* and *Allium*, with his methods of staining, and illustrated his results by drawings. He further remarked on the cultivation of aquatics in the laboratory.

Professor J. C. Arthur described his management of a south exposure in a botanical laboratory.

MONDAY, SEPTEMBER 2d.

A meeting was held at 9 A. M. in the cabin of the steamer "Nipissing," on the Lakes of Moskoka, most of the Club having participated in the excursion to these lakes, tendered to the Association by the Local Committee. The President occupied the chair, and Mr. Henry Farquhar was elected Secretary, in the absence of Dr. Campbell.

Mr. Meehan described the development of the inflorescence in *Corydalis sempervirens*.

Reports were then made by several members on the botanical results of the Moskoka excursion, a complete account of which will subsequently appear in the BULLETIN.

A meeting was also held at the same time in the room of the

Biological Section at Toronto; Professor Bessey was elected President *pro tem*, and Professor Arthur, Secretary.

TUESDAY, SEPTEMBER 3d.

The Club met in the room of the Section of Biology, the President in the chair, Professor Arthur, Secretary.

The Secretary stated that on account of necessary expenditures for postage and stationery, a debt of about four dollars had been incurred; this was at once liquidated by voluntary subscriptions and the announcement made of a gratifying surplus.

Remarks were made by several members as to the desirability of a permanent record of the minutes of the Club, and the Secretary was requested to cause such record to be made in the book already provided for the purpose.

The Committee on nomination of officers for the next meeting, consisting of Hon. David F. Day, Prof. C. E. Bessey and Mr. F. V. Coville, reported as follows: President, Dr. N. L. Britton, of New York; Vice President, Prof. F. L. Scribner, of Knoxville; Secretary, Prof. C. R. Barnes, of Madison.

The nominees were unanimously elected.

The committee appointed to consider Mr. Coville's report on the condition of botanical work at Washington, reported as follows:

> Having been informed of the action and encouraging work of the Botanical Division of the United States Department of Agriculture, we take great pleasure in expressing our high appreciation of the important work already accomplished and in the extensive undertakings in progress. The recognition by Congress of the importance of this botanical work, manifested by liberal appropriations of money, make possible, for the first time in America, adequate scientific and practical researches upon native and introduced plants—in health and disease—upon which the wealth of the country so largely depends, and in which is centered the highest educational and æsthetic interests.
>
> We heartily commend the management of the Botanical Division and the Section of Vegetable Pathology, by those now in charge, and cheerfully express our readiness to aid them in any and every possible way.
>
> T. J. BURRILL,
> DAVID F. DAY,
> *Committee.*

The report was unanimously accepted, and adopted as the expression of the Club.

The committee appointed to draft resolutions expressing the appreciation by the Club of the botanical explorations now being made by Dr. Thos. Morong in South America, reported as follows:

RESOLVED: That the compliments of the A. A. A. S. Botanical Club be sent to Dr. Thomas Morong, now making botanical collections in unexplored regions of South America, and that we tender to him an expression of our warmest interest in, and hearty appreciation of his arduous but highly promising labors in the new fields of his choice. We sincerely hope he may in due time return with health and strength, burdened only by abundant success and large contributions to the known flora of the world.

T. J. BURRILL,
DOUGLAS H. CAMPBELL,
Committee.

TO DR. THOMAS MORONG,
Ascuncion, Paraguay, South America.

The report was accepted and the Secretary requested to transmit a copy to Dr. Morong.

Mr. Coville reported the satisfactory progress of the operations of the Botanical Exchange Club under the direction of the National Herbarium. He stated that there were at present about twenty members. Over three thousand specimens had been received since the establishment of the Club two years ago, and a somewhat less number distributed.

Professor Joseph F. James read a paper on the value of color in plants as a character for classification, which will appear in a subsequent number of the BULLETIN, together with some additional memoranda relative to the same subject.

The committee appointed to draft resolutions expressive of the gratitude of the members of the Club to the members of the Local Committee for their uniform kindness and courtesy during the meeting, reported as follows:

WHEREAS: The Botanical Club of the A. A. A. S. having been most cordially and generously entertained by the citizens of Toronto, and

WHEREAS: The excursions tendered by the Local Committee of Toronto to the members of the Association have been especially enjoyed by the botanical members thereof, who have thus been enabled to visit points of especial interest:

Resolved, That the members of the Botanical Club extend their hearty thanks to the Local Committee for the arrangements made for their comfort and pleasure during the meeting of 1889.

N. L. BRITTON,
WM. H. SEAMAN,
JOSEPH F. JAMES.
Committee.

The report was unanimously accepted.

The following resolution offered by Professor Bessey was adopted:

Resolved. That the Botanical Club of the A. A. A. S. notes with great pleasure the liberality shown by the Canadian Government in providing the admirable new building and equipment for the Biological Department of the University of Toronto, and ventures to hope that at an early day the facilities here provided may be extended to include a suitable Botanic Garden, to which end the members of the Botanical Club pledge such assistance as may lie in their power.

The Club then adjourned to meet next year at Indianapolis, Ind., on the third Wednesday of August, 1890, at 9 o'clock A.M.

The following botanical papers were read in the Section of Biology, under the Vice-Presidency of Professor Geo. L. Goodale:

On the position of the nectar glands in *Echinops*, by Thomas Meehan.

On the epigynous gland in *Diervilla* and the genesis of *Lonicera* and *Diervilla*, by Thomas Meehan.

Some physiological traits of the solid stemmed grasses and especially of Indian Corn (maize), by F. L. Stewart.

On the genus *Eleocharis* in America, by N. L. Britton.

On the tropical distribution of certain sedges, by N. L. Britton.

Notes on seedlings of *Elymus Virginicus*, by W. J. Beal.

Notes on Bird's Eye Maple, by W. J. Beal.

On the assumption of floral characters by axial growths in *Andromeda Catesbæi*, by Thomas Meehan.

On the significance of dioecism as illustrated by *Pycnanthemum*, by Thomas Meehan.

On the flora of New Jersey, by N. L. Britton.

Reserve food substances in twigs, by Byron D. Halsted.

Notes upon stamens of Solanaceæ, by Byron D. Halsted.

The new botanical laboratory of Barnard College, by N. L. Britton.

A bacterial disease of Carnations, by J. C. Arthur.

Grasses of Roan Mountain, by F. Lamson Scribner.

Revision of the United States species of *Fuirena*, by Fred. V. Coville.

A bacterial disease of Indian Corn, by T. J. Burrill.

An observation on *Calamintha Nuttallii*, by David F. Day.

Fermentation of Ensilage, by T. J. Burrill.

Modern Teaching Appliances in Biology, by R. R. Wright.

On a convenient method of subjecting living cells to Coloring Agents, by George L. Goodale. (Title).

The next meeting of the Association will be held at Indianapolis, and we are sure that it will give pleasure to the readers of the BULLETIN to learn that it will be under the presidency of Professor George Lincoln Goodale.

Botanical Notes.

The University of Pennsylvania has recently issued a large octavo volume entitled "Handbook of Information concerning the School of Biology," giving full accounts of the advantages offered by that institution for the study of the Natural Sciences. The claim is made "that Philadelphia is better suited for the pursuit of biological study than almost any other American city," and it would certainly appear from the volume before us that the faculty of this School of Biology will substantiate the statement.

Greeneria fuliginea in Italy. In a recent issue of the "Nuovo Giornale Botanico Italiano" (Vol. xx. 441), record is made of the occurrence of this fungus of the vine in Vittorio, northern Italy, where it is also stated that the parasite had hitherto been unknown except in the United States.

Memoirs of the Club. Vol. i, No. 2, of the Memoirs, containing Mr. Martindale's paper on "Marine Algæ of the New Jersey Coast and adjacent waters of Staten Island," is ready for distribution to members and subscribers.

Reviews of Foreign Literature.

Germination of Lichens on Moss Protonema.

In the "Revue Generalé de Botanique" for April, 1889, M. Gaston Bonnier gives a continuation of his researches on the synthesis of lichens and their germination on the protonema of mosses, the first portion of which was reviewed by Miss Gregory in the January BULLETIN. M. Bonnier adds no new species of mosses to those already enumerated, but illustrates his paper by a colored plate showing in fig. 1 the green protonema of *Dicra-*

nella varia overrun by the filaments of *Cladonia pyxidata* drawn from specimens gathered at Fontainebleau. Occasionally gonidia are mixed with these filaments, in which case the latter are bound to the ordinary thallus by a felt of hyphæ, but it also happens that a similar felt covers for a great length the ramifications of the protonema without the presence of gonidia. It would seem from these circumstances that the spores of lichens germinate without algæ, and are able to await for a long time the presence of this complement so indispensable to their organization by living as parasites on the protonemas of mosses.

These observations led to a series of cultures attempting to associate a fungus issuing from a spore of a lichen with the protonema of a moss. The cultures were made as pure as possible on sterilized sand kept moist by water previously boiled and protected from germs of the air. These cultures easily produced protonemas from the spores of the following mosses: *Hypnum cupressiforme*, *Barbula muralis*, *Funaria hygrometrica*, *Mnium hornum*, *Dicranella varia*, and *Phascum cuspidatum*. On these when well developed were sown the spores of lichens. This is preferable to sowing both spores at once, as ordinarily the lichens germinate more rapidly than the mosses.

In studying the germination of the spores of *Parmelia aipolia* on the protonema of *Hypnum cupressiforme*, a pure cell-culture on glass, the filaments of the lichen were seen to cover with a regular network the ramifications of the protonema, extending to the very tips of all the branches; a similar culture of the spores of *Parmelia aipolia* alone, under the same conditions, never having produced a development comparable to that on the protonema. In fig. 3 is represented another culture, that of *Barbula muralis* enclosed by a net-work of the filaments of *Parmelia physodes*, forming a closer envelope approaching the formation of a false tissue, analagous to that observed in certain lichens where the gonidia are formed by filamentous algæ, such as have been so well described and figured by M. Bornet.

In the case of *Mnium hornum*, which produces a protonema with very large filaments, a singular development occurred, the formation of propagules on the protonema of the moss in contact with the lichen filament. On the more slender branches of the protonema, where the ramifications of the lichen were more dense, there were formed dilations clinging to the protonema, and here a curious phenomenon took place. The protonema swelled, forming a bud, in which accumulated a dense mass of protoplasm and threw across a partition, at the same time thickening its walls. Two or three months later, when all the rest of the cultures had disappeared, these "propagules" remained and later on germinated on a moist surface, producing the protonema of *Mnium* without the least trace of a lichen. This seems a remarkable mode of defence of the moss against the encroachments of the lichen filaments.

Never in all the cultures has the author seen fructification (apothecia, gonidia or other) on the filaments of the lichens, and ordinarily the cultures ended in the destruction of the protonema, on which the lichens seemed to act like a parasite. This partial asssociation, as in nature, seems to aid the lichen to germinate, permitting it to live during a time long enough to develop its filaments and search for the alga which would constitute its gonidia.

The development of these filaments was also observed on the leaves of mosses and hepatics, covering them with a false tissue; but the lichen does not develop definitely unless associated with algæ on the surface of the leaves of mosses. This was observed in the case of *Lecidea vernalis*, whose spores had germinated on the surface of a leaf of *Dicranella varia* which was found on the surface of a rock. After the filaments had developed and formed a net-work enclosing the leaf, their ramifications had encountered an alga and formed gonidia, constituting the ordinary association of the lichen, grafted, as it were, upon a moss.

Numerous such cases were observed on the leaves and stems of *Polytrichum*, *Dicranum*, *Mnium*, *Hypnums*, *Leskea*, *Jungermannia*, *Radula*, etc. It happens quite frequently at the base of rocks or beneath the stones along shady roads, as well as in the sub-alpine zone of the Alps and Pyrenees. Wherever mosses may be seen surrounded by various species of lichens, these may readily be observed germinating and following a similar evolution almost to the complete destruction of the mosses.

E. G. B.

Experiments with inverted Stems.

In the last number of the "Berichte der Deutsche botanische Gesellschaft," Professor Kny gives an account of some experiments he has recently made with inverted stems. *Hedera Helix* and *Ampelopsis quinquefolia* were chosen for this purpose. In 1884 several plants of both kinds were selected whose stems were about ten feet in length. These were so planted that both the stem and root end were completely under ground; the corresponding parts of the stem were bound, each to a separate support and allowed to grow in this manner for one year. At the end of this time the stem was carefully cut in the middle, or highest point, and from this time until 1889, both the inverted and the normally upright parts grew as separate individuals. The plants with inverted stems showed from the first a strong tendency to produce more and stronger buds near the real tip of the stem, that is, just above the ground, than at the other end. For the first year after the separation, only a few dwarfed buds were developed from the upper, while they developed and grew thriftily near the ground. The lowest of these were carefully removed each year, but the tendency to a richer production in that region than elsewhere along the stem remained somewhat active. The upper, that is, normally lower end of the stem also died down for some little distance shortly after the cut separating the two parts was made. But in the next following year or two, the uppermost side branches grew thriftily, and in the spring of 1888 the inverted plants presented in general the appearance of normally growing vines. The diameter of the stem at the ground was perceptibly greater than at the upper end. At the end of five years, or four if reckoned from the time of their independent existence, the inverted plants appeared to have accommodated themselves to their changed conditions. It was now thought time to examine whether this change was merely an outward one, or if it had reached deeper and affected the entire nature of the plant. A method previously followed by Vöchting was used to determine this. Sections of stems about twenty centimeters in length were cut from the inverted plants and hung in glass jars, some in the same position as when growing, others were inverted. The jars were kept in a dark room and the plants exposed to a saturated atmosphere. At first normal stems from ordinary growing plants were tested in this way to see what would be the effect in the growth of tip and basal end. It was found difficult to make a sharp distinction by means of the outgrowth of adventitious roots and stems. However, another means of determining how far the nature of the growing substance remained true to its inherited tendency presented itself. This was the development of the so-called *callous* at the cut end of the stems. In every case of the stems taken from the normally upright growing plants, this callous developed much faster at the lower end of the stem than at the upper. This remained the same in whichever way the stem was placed. There was no possibility of deception as to the real upper end of the stem by examining this callous. Now this process was repeated with the inverted plants with exactly the same results. The organic upper end of the stem would be detected with perfect certainty by the difference in the formation of the callous.

The author makes no attempt to explain this phenomenon. It was found to be a characteristic of the plant in its normal condition, and the experiments tried on the inverted stems proved that in this case at least, the inner nature of the plant had not undergone an entire change. Externally a complete change had taken place so far as morphological characteristics were concerned. E. L. G.

ZURICH, SWITZERLAND, July 28.

Index to Recent American Botanical Literature.

Agarics—North American. Robt. K. Macadam. (Journ. Mycol. v. 58-64, Part I).

Albinism among Flowers. C. R. Orcutt. (West Am. Sci. vi. 77). A list of albino plants collected by the author in California.

Algæ of Minnesota—Some. J. C. Arthur. (Reprinted from Bull. Minn. Acad. Nat. Sci. iii. 97-103).

American Magnolias. (Garden, xxxvi, 28).

Anemone cylindrica with Involucels. H. J. Webber. (Amer. Nat. xxiii. 264).

Found at Lincoln, Nebraska.

Aster—A Key to the Species of. Alfred C. Stokes. (Journ. Trenton Soc. Nat. Hist. ii. 52-74).

Avrainvillea—A Systematic and Structural Account of the Genus. Geo. Murray and Leonard A. Boodle. (Journ. Bot. xxxvii. 67-72, 97-101; Tab. 288, 289).

Bahia confertiflora, Chænactis tenuifolia und Antirrhinum Nuttallianum. E. Regel. (Gartenflora, t. 1275).

Barberry Flowers. Byron D. Halsted. (Bot. Gaz. xvi. 201).

Basidiomycetes and Myxomycetes—Generic Synopses of. L. M. Underwood and O. F. Cook. (Pamphlet, pp. 21; no date).

This pamphlet is to accompany "A Century of Illustrative Fungi," put up by the authors and designed to illustrate all the important groups and as wide a range of genera as possible, which they offer for sale at six dollars, postpaid. The set is planned as an aid to instructors and a guide to students wishing to pursue the study of these organisms. It is well worth the price asked, and as but fifty copies have been prepared, the edition will soon be exhausted.

Carpenteria Californica. (Garden, xxxvi. 26: illustrated).

Cattleya velutina, var. Lietzei. E. Regel. (Gartenflora, t. 1265).

Changes in the Fauna and Flora of California. H. H. Behr. (Proc. Cal. Acad. Sci. (II) i. 94-99).

Compositæ as Delimited in Gray's Synoptical Flora of North America—A Key to the Genera of the. Alfred C. Stokes. (Journ. Trenton Nat. Hist. Soc. ii. 9-41).

Contributions to West American Botany.—I. (West Am. Sci. vi. 62, 63).

A new species, *Hosackia Haydoni* is described. In common with *H. glabra*, Torr., it is known as "deer-weed."

Desmids of the Pacific Coast. Francis Wolle. (Proc. Cal. Acad. Sci. (II.) i. 79, 80).

A list of species collected at Donner, Truckee and Reno, Nev.

Dionæa muscipula. Constance G. DuBois. (Bot. Gaz. xvi. 201).

Diorchidium Tracyi. B. T. Galloway. (Journ. Mycol. v. 95, Pl. X. Figs. 3 and 4).

Echinocactus Texensis, Hopfer. E. Regel. (Gartenflora, t. 1286).

Edible Plants of the World. E. Lewis Sturtevant. (Agric. Science, iii. 174-178).

The author has here tabulated the number of species recorded as edible in each of the natural plant orders. The Leguminosæ are at the head in point of edible species, 320 being recorded, 119 of which are cultivated for food. Of the Fungi there are 339 reported as edible, 3 cultivated. The list is one of great interest and value to the student of economic botany.

Exsiccati in the Herbarium—The Treatment of. Roscoe Pound. (Amer. Nat. xxiii. 263, 264).

A further argument for cutting them up and distributing the species into their genera.

Fagus Antarctica. A. D. Webster. (Garden, xxxvi. 27, 28).

Flowers and Insects—II. Chas. Robertson. (Bot. Gaz. xiv. 172-178 ; illustrated).

Fungi from Western New York—Notes on New or Rare. Chas. E. Fairman. (Journ. Mycol. v. 78-80).

Two new species are described.

Fungi—New species of. W. A. Kellerman and W. T. Swingle. (Journ. Mycol. v. 72-78).

Nine new species are described.

Fungi—New Species of Hyphomycetous. J. B. Ellis and B. M. Everhart (Journ. Mycol. v. 68-72, Pl. X., Figs. 1 and 2).

A new genus and species is described and figured—*Langloisula spinosa.*

Fungi—New Western. J. B. Ellis and B. T. Galloway. (Journ. Mycol. v. 65-68, Pl. X, Figs. 5 and 6).

Thirteen new species are described. *Septosporium heterosporium* is figured.

Fungi of Custer County, Colo.—Some. T. D. A. Cockerell. (Journ. Mycol. v. 84, 85).

Fungi—Notes on.—I. W. G. Farlow. (Bot. Gaz. xiv. 187-190).

Fungi—North American. Part II. A. P. Morgan. (Journ. Cin. Soc. Nat. Hist. xii. 8-22, Pl. i, ii. Reprinted).

This paper deals with the *Lycoperdaceæ. Geaster hygrometricus*, Pers., is relegated to a new genus (*Astræus*) and we shall hereafter know this fungus as *Astræus hygrometricus*, (Pers.) Morg. The author says: "It is impossible to define accurately the genus *Geaster* and retain this species with it."

Fungi of Helena, Mont.—Notes on the. F. D. Kelsey. (Journ. Mycol. v. 80-82).

Supplementary notes to the above are also given in the succeeding article by F. W. Anderson.

Galvesia juncea. (Gartenflora, xxxvii, 400, f. 91).

Girdled Limb—Extraordinary Vitality in a. A. C. Apgar. (Journ. Trenton Nat. Hist. Soc. ii. 7-9, Pl. 1).

Glœosporium nervisequum. E. A. Southworth. (Journ. Mycol. v. 51, 52).

Gymnosporangium—Notes on Cultures of—made in 1887 *and* 1888. Roland Thaxter. (Bot. Gaz. xiv. 163-172).

Hepaticæ—Notes on our. Lucien M. Underwood. (Bot. Gaz. xiv. 191-198).

An extremely interesting paper on some of our northern species, special attention being paid to the nomenclatorial questions involved. Dr. Underwood bases his names strictly on the principle of priority and cites the original author of the specific names accepted in parentheses. He recognizes 140 northeastern species, of which "four are known only from their original descriptions, no specimens existing in any American Collection." He accepts some pre-Linnæan binomials, which is of interest in the discussion now in progress.

Hypericum—Some Notes on. John M. Coulter. (Bot. Gaz. xvi. 200).

Jamaica—Annual Report on the Public Gardens and Plantations for the Year ending 30*th September*, 1888. (Gov. Printing Est., Kingston, Jamaica, 1889).

Kansas Fungi—Kellerman and Swingle. Fascicle II., Nos. 26-50.

If all new species of American fungi were as liberally distributed as these sets have been, there would be no complaint abroad that "our types are impossible to get." The present fascicle includes six of Ellis and Kellerman's species, and two of Peck's, and represents in all thirteen different genera with twenty-five species. Like the preceding, the specimens are models of neatness and generous in quantity.

Lepidium Virginicum in Italia—Sulla subspontaneita del. L. Micheletti (Nuovo Giorn. Bot. Ital. xxi. 479-481).

Another of our common plants is recorded as naturalized in

Italy, near Cassano del Adda in Lombardy. It is also established in the vicinity of Bayonne, France.

Lithospermum—Notes on. Byron D. Halsted (Bot. Gaz. xvi. 202, 203).

Marine Algæ of the New Jersey coast and adjacent waters of Staten Island. Isaac C. Martindale (Memoirs Torrey Bot. Club. i. 87-111. Price 50 cents).

Mr. Martindale's enumeration of the Algæ hitherto found on these shores taken with Dr. Farlow's "Marine Algæ of New England" and Mr. Pike's list of those found on Long Island, gives us now all the available information concerning the algal flora from Canada to Delaware Bay. In the present paper 223 species and varieties are listed with full citation of localities and collectors. The author is to be congratulated on his success in enlisting the services of many collectors. This contribution to American Algology should certainly stimulate the study of seaweeds, and it is certain that the field which he has so diligently explored will yield new information to those entering it for many years to come.

Mucronoporus. J. B. Ellis and B. M. Everhart. (Journ. Mycol. v. 90-92).

Mutisia Clematis. (Garden, xxxvi. 78, 79, Pl. 711).

Nuclear Division—Studies in. Douglas H. Campbell (Bot. Gaz. xvi. 199).

Oncidium Jonesianum. H. G. Reichenbach and E. Ortgies. (Gartenflora, t. 1272).

Opuntia Fruit as an Article of Food. Edward Palmer. (West Am. Sci. vi. 67-69).

Pinus insignis. W. Coleman. (Garden xxxvi. 47, illustrated).

Platanus occidentalis. (Garden and Forest, ii. 352, illustrated).

Polygonum incarnatum with four-parted Perianth. H. J. Webber. (Amer. Nat. xxiii. 264).

Reported as common in the vicinity of Lincoln, Nebraska.

Pond Weeds—Notes on. Alfred Fryer. (Journ. Bot. xxvii. 65-67, Tab. 287-289.)

Accompanying this article is a representation of *Potamogeton* **varians,** Morong.

Potamogeton rufescens, Schrad—The Synonomy of. Arthur Bennett. (Journ. Bot. xxvii. 242-244).

Pucciniæ—The Heterœcismal. H. L. Bolley. (Am. Month. Mic. Journ. x. 169-180, illustrated).

Pyrenomycetes—Contributions to the History of the Development of the. Franz von Tavel. (Journn. Mycol. v. 53-58, Pl. ix).

Glœosporium nervisequum and *Fenestella platani* are subjects of illustration.

Roses—North American; Remarks on Characters with Classification. G. N. Best. (Journ. Trenton Nat. Hist. Soc. ii. 1-7).

Dr. Best gives us here some of the results reached by him in the study of the difficult genus *Rosa*, after several years research, with continued reference to the work of M. Crépin in Belgium. It would be well for botanical science if more of our students would turn their attention to the close investigation of single orders or genera, for in this way only can satisfactory results be reached, and order brought out of the chaotic condition of American systematic botany.

Senecio petasites. (Gard. Chron. vi. 47, Fig. 9).

Side Saddle Plants. H. Hendricks. (Garden, xxxvi. 37).

Solidago as Diagnosed in Gray's Synoptical Flora of North America—A Key to the Species of. Alfred C. Stokes. (Journ. Trenton Nat. Hist. Soc. ii. 41-52).

Sphærotheca phytophila—Notes upon. B. D. Halsted. (Journ. Mycol. v. 85, 86).

Sprouting of Seeds—On the Influence of Certain Conditions upon the. L. H. Bailey. (Bull. No. vii. Agric. Exp. Station, Cornell Univ., Coll. of Agric. Pamph. 8vo. July, 1889, illustrated).

Sumachs—The. (Garden and Forest, ii. 338, 339).

Sycamore—What is a. (Garden and Forest, ii. 349. 350).

Ficus Sycomorus, *Acer Pseudo-platanus* and *Platanus occidentalis* are the three trees commonly called "sycamore." The first can claim the title on the score of antiquity, it being the sycamore of the Bible, *Sycomorus* of the Romans and *Sykomoros* of the Greeks, from "Sykon," Fig, and "Moron," Mulberry. In England the title is applied to the second named, and in our own country the third named monopolizes it, while throughout Europe it is never applied to *Platanus*. On the score of priority and etymology we certainly ought to allow *Ficus Sycomorus* to retain undisputed possession of the popular name, calling our own *Platanus* by the almost equally well known and suggestive title of "Buttonwood".

"*The Botanist.*"—*Being the Botanical Part of a Course of Lectures in Natural History, Delivered in the University of Cambridge, together with a discourse on the Principles of Vitality, by Benjamin Waterhouse, M.D.*, Boston, 1811. H. B. Small. (Ottawa Nat. iii. 58-62).

Excerpts from lectures delivered about a century ago, and said to be the first botanical lectures delivered in America. The principles inculcated read curious enough at the present day. Thus: "there is a small quantity of vital air in a sac, bladder or partition at the big end of every bird's egg: and we presume there is a small portion of the same kind of fluid in every seed; or it may be oxygen in a concentrated state, which is afterwards combined with caloric in the process of incubation." Again: "From numerous well conducted experiments, it appears that a *mucilage* produced by the decomposition of vegetable and animal recrements, constitutes the food or aliment of plants. This aliment is formed from stable manures, from rain water putrefied, from dew, as well as from dead animals and vegetables. To reconcile the doctrine taught by some, that *salt* is the active principle in manures, it should be remembered that putrefaction has two stages; the first converts animal and vegetable substances into a mucilage, and the second converts that mucilage into one or more species of salt," etc., etc.

Trees and Shrubs of San Diego County, California. C. R. Orcutt. (West Am. Sci. vi. 64, 65).

Violets—Sterility of. Thos. Meehan. (Bot. Gaz. xvi. 200).

Vitis palmata. C. S. S. (Garden and Forest, ii. 340, Fig. 118).

Vitis pterophora, Baker. B. Stein. (Gartenflora, t. 1273).

Volvox—The polar Differentiation of, and the Specialization of possible anterior Sense-organs. John A. Ryder. (Amer. Nat. xxiii. 218-221).

Wheat Rust. H. L. Bolley. (Bull. Agric. Exp. Station, Ind. No. 26).

Zygopetalum brachypetalum, var. stenopetalum. E. Regel. (Gartenflora, t. 1277).

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XVI.] New York, October 5, 1889. [No. 10.

An Enumeration of the Plants Collected by Dr. H. H. Rusby in South America, 1885-1886.—VIII.

(Continued from p. 192.)

Lupinus humifusus, Benth. Pl. Hartw. 169. Sorata, 13,000 ft. (955); the same as Mandon No. 687.

Lupinus Bogotensis, Benth. l. c. 168. Near La Paz, 10,000 ft. (954); the same as Holton's No. 946 from New Grenada.

Spartium junceum, L. Sp. Pl. 995. Near La Paz, 10,000 ft. (1016); abundantly escaped from cultivation.

Medicago denticulata, Willd. Sp. Pl. iii. 1414. Near La Paz, 10,000 ft. (1018); a weed.

Medicago lupulina, L. l. c. 1097. Near La Paz, 10,000 ft. (1019 and 1968); abundantly introduced.

Melilotus Indica (L.), All. Flor. Ped. i. 308. Near La Paz, 10,000 ft. (1017).

Trifolium amabile, HBK. l. c. vi. 503. Near La Paz, 10,000 ft. (1012, 1013, 1014 and 1015).

Psoralea Mutisii, HBK. l. c. 487. Near La Paz, 10,000 ft. (957); a form with calyx lobes nearly triangular.

Psoralea, perhaps a broad-leaved form of the last, but indeterminable. Sorata, 8,000 ft. (958).

Psoralea glandulosa, L. Sp. Pl. 1075. Valparaiso (956).

Indigofera lespedezoides, HBK. l. c. 457. Reis, 1,500 ft. (1439).

DALEA BOLIVIANA, spec. nova. Suffruticosa, prostrata, ramosissima, foliolis 13-17, cuneato-oblongis, truncatis vel emarginatis, punctatis, glabris, 3-5 mm. longis; ramulis et rachis pubescentibus; spicis oblongis, 2-3 cm. longis; bracteis obovatis, longe acuminatis, pubescentibus; calycis villosis, dentibus tubo multo brevioribus; corolla 8-10 mm. longa. purpurea. Near La Paz, 10,000 ft. (959).

Related to *D. humifusa*, Benth. Pl. Hartw. 170; collected also by R. Pearce at La Paz, 12,000 ft. April, 1864, and by Mandon (No. 702).

Barbiera polyphylla, DC. Mem. Leg. 242. Guanai, 2,000 ft. (2356).

Tephrosia leptostachya, DC. Prodr. ii. 251. Unduavi, 8,000 ft. (1343).

Tephrosia toxicaria, Pers. Syn. ii. 329. Mapiri, 5,000 ft. (985). Bolivian name "sacha."

Cracca ochroleuca (Pers.), Benth. in Oerst. Leg. Cent. Amer. 9. Yungas, 6,000 ft. (2355).

COURSETIA BOLIVIANA, spec. nova. Frutex scandens; foliolis 15-19, oblongis, 3-4 cm. longis, 1-5 cm. latis, obtusis, mucronatis, utrinque minutissime pubescentibus, breviter petiolatis; racemis axillaribus, elongatis, 10-20 floris, 9-18 cm. longis; floribus pedicillatis, 8 mm. latis; petalis exteriore pubescentibus, calycibus 5-dentatis, bibracteolatis; bracteolis linearibus. Folia 15-20 cm. longa. Sorata, 8,000 ft. (1043 and 1344).

Astragalus uniflorus, DC. Mem. Astrag. t. 50. Sorata, 13,000 ft. (1925). The same as Mandon's No. 713.

ASTRAGALUS CAPITELLUS, spec. nova. Herbaceus vel basi lignescens, 20-25 cm. altus; foliolis 16-19, oblongo-linearibus, 1 cm. longis, 2-3 mm. latis, supra glabratis, subter albopubescentibus; folia 5-9 cm. longa, foliola distantia; stipulis triangularibus, scariosis; pedunculis axillaribus, ad maturitatem 1 cm. longis, parce pilosis; capitellis paucifloris, flores minores; calycibus 2 mm. longis, laciniis subulatis; leguminnibus 12 mm. longis, oblongis, apiculatis, puberulis, sulcatis, 10-spermis. Capitellis sub 6-floris. Near La Paz, 10,000 ft. (1005). Apparently the same as Mandon's No. 714, Herb. Kew.

Chætocalyx Brasiliensis (Vogel), Benth. in Mart. Fl. Bras. xv. Pars 1. 75. Guanai, 2,000 ft. (2398).

Amicia Lobbiana, Benth. in Herb. Kew. Sorata, 10,000 ft. (1333). The same as Mandon No. 765.

Æschynomene sensitiva, Sw. Fl. Ind. Occ. iii. 1276. Falls of the Madeira, Brazil. (1037).

Æschynomene Hystrix, Poir. Dict. Suppl. iv. 77. Same locality. (1038).

Æschynomene falcata, DC. Prodr. ii. 322. Guanai, 2,000 ft. (1035).

Æschynomene Brasiliana, DC. l. c. Sorata, 10,000 ft. (1036).

Adesmia microphylla, Hook. & Arn. Bot. Beech. 19. Near Valparaiso, Chili, (2512 and 1040),[1] the latter number distributed as from near La Paz, which is almost certainly due to a confusion of labels.

Adesmia Miraflorensis, Remy. Ann. Sci. Nat. (III.), vi. 357, ex descriptio. Near La Paz, 10,000 ft. (1039 and 1041).

Stylosanthes Guianensis (Aubl.), Sw. Act. Holm. 1789, 296. Near La Paz, 10,000 ft. (1008); Guanai, 2,000 ft. (2324).

Zornia diphylla (L.), Pers. Syn. ii. 318. Guanai, 2,000 ft. (1156). var. *latifolia* (DC.), Benth. in Mart. Fl. Bras. xv. Pars. 1. 81. Unduavi, 8,000 ft. (1971). Specimens with exceedingly large bracts; referred to this variety with much hesitation.

Desmodium cajanifolium (HBK.), DC. Prodr. ii. 331. Guanai, 2,000 ft. (966); Mapiri, 5,000 ft. (967 and 968); Reis, 1,500 ft. (969). Also a form or variety with very large flowers, Yungas, 6,000 ft. (965).

Desmodium axillare (Sw.), DC. l. c. 333. Falls of Madeira, Brazil, (960); Mapiri, 5,000 ft. (963).

Desmodium albiflorum, Salzm. in Benth. l. c. 99. Yungas, 6,000 ft. (975).

Desmodium molliculum (HBK.), DC. l. c. 331. Sorata, 10,000 ft. (973).

DESMODIUM MANDONI, spec. nova. Caulibus ascendentibus, frutescentibus, pilosis; foliolis ovatis vel oblongis, obtusis, apiculatis, breviter petiolatis, supra glabratis, subter pilosis, 4–5 cm. longis; racemis terminalibus elongatis (15 cm. longis); flores purpurei, magni, (12 mm. lati), gracile pedicellati; bracteis acuminatis, glabris; calycis lobi acuminati; leguminibus 4-articulatis, articulis oblongis, breviter pilosis.

Sorata, 10,000 ft. (970), Yungas, 6,000 ft. (964 as to the flowering specimens; the fruit distributed with this number belongs to some other species, perhaps *D. tortuosum*). The same as Mandon's Nos. 733 and 738.

Desmodium, a species resembling the last and apparently the same as Mandon's 732 and 735, but only in flower (976).

Desmodium adscendens (Sw.), DC. l. c. 332. Mapiri, 5,000 ft. (977).

DESMODIUM YUNGASENSE, spec. nova. Caulibus repentibus vel ascendentibus; ramulis pilosis; foliolis ovatis vel lanceolatis, tenuis, obtusis, mucronulatis, breviter petiolatis, supra glabratis, subter albo-pilosis; racemis terminalibus axillaribusque, elongatis; flores caerulei ?, parvi, (7 mm. lati); gracile pedicellati; bracteis et calycibus valde pilosis; leguminibus 5-articulatis, articulis oblongis, dense et breviter tomentosis. Yungas, 4,000 ft. (974).

Evidently related to *D. Mandonii*, but with smaller flowers, thinner and smaller leaves and pilose bracts and calyx.

Desmodium. A species apparently related to *D. axillare.* Falls of the Madeira, Brazil (961); junction of the Beni and Madre de Dios (962).

Desmodium sclerophyllum, Benth. in Mart. Fl. Bras. xv. Pars. 1., 102. Reis, 1,500 ft. (2349).

Desmodium barbatum (L.), Benth. l. c. 96. Reis, 1,500 ft. (971).

Vicia sativa, L. var. *angustifolia* (Roth), Ser. Near La Paz, 10,000 ft. (1006). Introduced.

Vicia graminea, Sm. in Rees Cyclop. fide Benth. l. c. Sorata, 10,000 ft. (1007). The same as Mandon, No. 724.

Lathyrus pubescens, Hook. & Arn. Bot. Beech. 21. Sorata, 10,000 ft. (1011).

Faba vulgaris, L. Cultivated in Yungas, 4,000 ft. (1010).

Centrosema Plumieri (Juss.), Benth. l. c. 127. Guanai, 2,000 ft. (2354).

Centrosema pubescens, Benth. l. c. 131. Reis, 1,500 ft. (1345).

Centrosema Virginianum (L.), Benth. l. c. 132. Yungas, 6,000 ft. (1340). The same as Mandon's 744.

Centrosema hastatum, Benth. l. c. Guanai, 2,000 ft. (1049).

Clitoria Poitæi, DC. Prodr. ii. 234. Guanai, 2,000 ft. (2399).

Cologania ovalifolia, HBK. Nov. gen. vi. 412. Sorata, 10,000 ft. (1338).

Teramnus uncinatus, (L.), Sw. Fl. Ind. Occ. iii. 1238. Reis, 1,500 ft. (1346).

CALOPOGONIUM CÆRULEUM (Benth). (*Stenolobium cæruleum*, Benth. Ann. Mus Vind. ii. 125). Guanai, 2,000 ft. (2629).

Galactia tenuiflora (Willd.), Wight. & Arn. Prodr. i. 206. Guanai, 2,000 ft. (2370).

GALACTIA SPECIOSA (DC). (*Collæa speciosa*, DC., Mem. Leg. 245). Yungas, 6,000 ft. (1341); Unduavi, 8,000 ft. (1342).

A Trip Among the Rangeley Lakes.

The Rangeley Lakes are famous as a favorite resort for the fisherman and hunter, but to the botanist they are not, perhaps, so well known. It was the writer's good fortune during the past summer to spend several weeks collecting in the wilderness which surrounds the lakes. There are five of the principal ones, very irregular in shape, and extending in a general northeast and southwest direction. Their outlet is through the Androscoggin River. All around are mountains, and the whole country is densely wooded. Except the little space along a brook where our camp was pitched there was not a natural clearing to be seen for miles in any direction. During the winter the woods swarm with lumbermen, and we frequently happened upon their deserted cabins. The forests are composed chiefly of spruce, hemlock and pines, mixed with maples, birches and beeches. Yellow, black and white birches are found, the white being the canoe or paper birch. Along the border of the lakes is a fringe of the white birches, which in many places have been killed by the rise in the water, consequent on the building of the dams between the lakes.

One of the first plants to catch the eye of a stranger is the *Cornus Canadensis*. At the time of our visit it was in fruit, and its red berries lent color to the roadside everywhere in great profusion. Under the evergreens on the rocks were quantities of the white stars of *Dalibarda repens*, most abundant of all the Rosaceæ. Most of the common plants of the North were there, among them great beds of *Linnæa borealis*, and the long trailing stems of *Chiogenes hispidula*, its waxen berries hidden among the leaves.

Of course the Ericaceæ were well represented. Beside the one already mentioned there were *Moneses uniflora*, two or three *Pyrolas*, *Gaultheria procumbens* and the other familiar ones. *Kalmia glauca* grew along the trails and in the swamps. It is lower, and its small flowers are far more brilliant than *K. latifolia*, which takes its place in southern New England.

About three miles from our camp, which by the way was on Lake Molechunkamunk, was a pond set in among the mountains, and only reached after a hard climb. Along the southern shore is a peat bog which is gradually encroaching on the pond. Here in the moss were low thickets of *K. glauca* with *Andromeda Polifolia*, and various *Vacciniums*. Scattered through the swamp were clumps of tamarack and other evergreens. The moss formed a deep carpet, with very few grasses. About the only sedge we found there was *Carex pauciflora* and this was not abundant. One could hardly take a step in the bog without treading on the half-filled leaves of the pitcher plant. This swamp was evidently a favorite haunt for the deer, for through it ran a perfect network of paths. It was difficult to get near enough to the water to determine the water plants, but with the aid of a long pole we succeeded in securing *Potamogeton Pennsylvanicus* and *Utricularia vulgaris*.

Compositæ were not abundant around our camp, the principal representative being *Solidago thyrsoidea*, which grows rather commonly along the trails. Its flowers are so large as to seem at first sight like small asters in shape. There were other *Solidagos*, but they were not abundant. Of the Ranunculaceæ we noticed only two. In muddy places along the shore there were dense patches of *Ranunculus reptans*. Its slender leaves and peculiar habit of growth give it the appearance of some *Eleocharis*, but the secret is revealed by its yellow flowers. The other species noticed was *R. Pennsylvanicus*, which was abundant in one locality.

The lakes did not seem to be rich in sedges, our collection yielding only half a dozen Carices, among which may be mentioned *C. trisperma*, quite common on the mountain sides, and *C. lenticularis*, growing in a few clumps in the sand near the shore. Of the Juncaceæ the most common was *Juncus filiformis*, though once or twice by the brook we found *Luzula parviflora*, var *melanocarpa*, growing among the stones.

Ferns were not very abundant and consisted mostly of small species, very commonly *Phegopteris connectile* and *P. Dryopteris*. The Lycopodiums were quite abundant, but not rich in species. *L. annotinum* was the one most frequently met with.

Among our chief objects of search were the Orchids. Of these we found a number of species. *Goodyera repens* was quite abundant everywhere, and on a bold point projecting into the lake *Microstylis ophioglossoides* was common. Up on the mountain side we secured a few beautiful specimens of *Habenaria orbiculata.* One of the coolest and prettiest spots we found was not far from our camp. The birches had been killed some time by the water and lay tumbled in dense tangles, so one could walk for rods on the crossed and leaning trunks. Underneath was a carpet of moss which in many places concealed a treacherous black mud. Just where this tract bordered the spruce forest seemed to be the favorite haunt for several species of Orchids. Here we found *Habenaria obtusata* growing in abundance, and with it *Listera cordata*, its stalk buried in the moss so that its outspread leaves lay on the surface. Here too, we found *Corallorhiza innata*, though a careful search proved that it was not common. These Orchids were accompanied by beds of the wood sorrel, (*Oxalis Acetosella*) common everywhere in the woods, and one of the most delicate of the wood flowers in its coloring. The only *Spiranthes* that we saw was *S. Romanzoviana* which grew occasionally in clear spaces and along the road by which we came to the lakes. Near this road we found one specimen of *Habenaria dilatata*, the only one we saw. Along Black Brook, a stream which takes its rise near the lakes, we found in places great quantities of that most showy of all our northern Orchids, *Habenaria fimbriata.*

One unused to the country is impressed with the paucity of species, though a longer search would doubtless greatly increase the list. The *Ericaceæ* were best represented in species, though as far as number of individuals is concerned nothing can compare with *Cornus Canadensis.* The Scrophulariaceæ and Labiatæ were not at all numerous, while of the Leguminosæ we did not find a single specimen, so far as I can remember. In considering this statement it must be borne in mind that it is based on collections made during a period of only a few weeks in July, and in a limited area along two of the lakes.

L. N. JOHNSON.

EVANSTON, Sept. 12, 1889.

Botanical Notes.

Plate XCIV.

In the September number of the Botanical Gazette for 1881 a note is published on a peculiar method of budding in *Nasturium lacustre.* Having had doubts as to the correct interpretation of the facts, this plant has since been re-examined and the accompanying figures prepared. The plant is aquatic; its lower leaves are pinnately dissected and immersed, the upper leaves are more simple, usually ovate-oblong, and emersed, although towards the close of the flowering season all leaves are apt to be more or less under water. About the middle of August the pinnate leaves break off and float on the surface of the water. At their base, in the place corresponding to the axil, a few very small leaves appear in a cluster, from which a few days later a branch begins to develop, in a direction opposite to the parent leaf, at the end of which a cluster of leaves forms a rosette, which floats on the surface of the water. From the very first a number of roots appear, which grow along the upper surface of the floating parent leaf in a direction towards its apex. This growth of the roots up the inclined base of the petiole where it must be exposed to the light was different from what has been observed elsewhere in the growth of roots, and this led to a re examination of the plant. It would seem a much more natural course of events if the roots would immediately bend over the edges of the petiole and seek as well as they could the darker side beneath. No such effort, however, seems to be made until the roots are from one-fourth to one-third of an inch in length. Soon after the new branch has grown so long and the base becomes so much thickened that the end to which the old leaf is attached gradually sags downward into the water, and in due time the roots have grown long enough to touch the bottom and fasten the plant. The old leaf simply decays. It is now quite certain that the roots do not derive food from the parent leaves, but why they should seek the upper surface seems very strange.

It has been customary to notice from time to time the autumn flowering of our spring plants. Perhaps, considering the regularity with which the warmer seasons of autumn, called Indian summer, come to our northern States from year to year, it were just as well to consider the autumn flowering of some species as in the regular course of events. This is especially true of the violets. There is a place near North Attleboro, Massachusetts, where *Viola lanceolata* and *Viola canina*, var. *Muhlenbergii*, grow in great profusion. Not a year passes that I do not gather hundreds of blossoms from this locality towards the last weeks of September and the first of October. I expect to find them in blossom then, and should be surprised if I did not. They are not in such great profusion as in spring, of course, but are still quite common. In the same way, along the middle of October, *Viola pedata* is found in considerable abundance along some localities near Assawompsett Pond near Middleborough, Massachusetts. Other species have been invariably found but never in great numbers: *Viola primulæfolia* and *Viola cucullata*, which are found during the last weeks of September at North Attleboro, Massachusetts. *Viola striata* I have seen in blossom at Granville, Ohio, during the autumn of 1885, but never had occasion to look for the same again. Two species of violets, which from their frequency in spring I should have found in their respective haunts in autumn if they were in flower, *Viola sagittata* and *Viola pubescens*, I have never discovered in flower at that time of the year. It is not an uncommon feature of certain of the fall violets not to develop all their petals typically. This is especially true of *Viola lanceolata*, and in a certain measure of *V. cucullata.* Although most of the blossoms appear to be perfectly normal, those developed in colder weather show a tendency of the lateral and upper petals to become abortive, so that the lower petal in one flower may be well developed, the lateral petals may be reduced to one-third their normal size, and the upper petals may be visible only after the surrounding sepals have been dissected away. It will be noticed that in the process of this abortion those petals which are most necessary to guide the insects to the honey are aborted last. The semi-aborted petals have also a tendency to project straight forward in line with the sepals, and not to expand as in ordinary flowers, *in effect* increasing the size of the lower petal with which they are thus made contiguous.

A few plants were found in blossom this year which do not show the same regularity in their autumn blossoming. Well developed blossoms of *Aquilegia Canadensis* were found near North Attleboro, Massachusetts, during the first weeks of October. *Geranium maculatum* was found at the same locality in September and August. *Corydalis sempervirens* appears more regularly near North Attleboro, Massachusetts, with thickened leaves, the petioles and stems almost succulent, and greenish, poorly developed flowers, of which a few occasionally reach their normal development. Autumnal blossoming is no new botanical feature, yet it seems worth while to place these notes on record in order that eventually it may be determined what plants are thus affected by our Indian summer, to what extent, and with what regularity.

AUG. F. FOERSTE.

Fig. 1. Leaf with a few small leaves and three roots as its base.

Fig. 2. Leaf with three roots and a number of small leaves at its base, from among which a branch has developed.

Fig. 3. Leaf at base of flowering racemes.

Fig. 4. Ordinary and usually emersed leaf.

Remarks upon Color as a Distinguishing Feature of Certain Species of Plants.*

BY JOSEPH F. JAMES.

In considering the various points used in characterizing species of animals and plants, there is no one feature regarded as of less value and importance than color. The color of the epidermis and of the nacre of some species of *Unio*, is very uncertain. The colors of the black bass vary with its surroundings. Birds change their plumage and animals their pelage in winter so that it is different from what it is in summer. In the plant world occasional variations from the normal occur, so that white lobelias instead of blue, or white-flowered red clovers are not uncommon. But color in certain other and mostly small genera, is an important and frequently almost the sole distinction, certainly the one most easily perceived and recognized. As instances of this I shall cite a few examples.

In the district covered by Gray's Manual there are three species of *Petalostemon*, two of which are very similar in general characters. These are *P. candidus* and *P. violaceus*. They differ slightly in the size and number of their leaflets and in certain minor characters, but the main distinguishing feature is in the color of the flowers. In the first species these are *white*, and in the second they are *rose-purple*. The two species can be, and indeed are, recognized at a glance by their respective colors, but assurance can be made doubly sure by an inspection of the leaves.

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*Read before the Botanical Club A. A. A. S., at the Toronto Meeting, Aug. 29–Sept. 3, 1889.

Another instance is found in the two species of *Impatiens* native to our region. These are *I. biflora* and *I. aurea*. As in the former case the color of the flower distinguishes the species. In *fulva* it is mottled red, and in *pallida* it is yellow. In the leaves a slight difference is noticeable, these being larger in one than in the other, and in the position of the flower and the color of the stem there is also a difference. But in spite of these, which might here be called minor differences, the color is the main guide in separation.

A third example is found in the two species of *Melilotus*. One of these, *M. alba*, has white flowers, the other, *M. officinalis*, has yellow ones. Here almost the sole distinction is the color. The shape of the leaves varies slightly, but the color of the flowers comes first to separate the two species.

Still another example of this point is observed in the two species of *Datura*, namely, *D. Stramonium* and *D. Tatula*. In the first of these species the flowers are white, and in the second they are purple. The stem of the first is green and the second purple, so that here not only does the color of the flower form a characteristic feature, but that of the stem also. In other respects they are almost precisely alike, so much so that Gray remarks that one is thought to be specifically distinct from the other "on account of the behavior of the cross breeds." An ordinary student has not the time to inquire into the behavior of cross breeds. In the meanwhile he takes the color of the flowers as his distinguishing characteristic.

The genus *Baptisia* is, in this relation, an interesting one. There are five species in our district, and of the five only two are alike in color. *B. alba* and *leucantha* are white; *B. leucophæa* is cream colored; *B. tinctoria* is yellow and *B. australis* is blue. It is true that in this case the color does not *alone* form a distinguishing feature, because the species differ in other respects. It is an instance in which both the xanthic and the cyanic series of colors are represented in the same genus.

Other examples of color distinguishing species of plants could doubtless be given. If we turn from flowers to fruits a few instances may be cited. In *Sambucus Canadensis* the fruit is a deep black. In *S. pubens* it is red. In other respects these plants are similar. In *Morus rubra* the fruit is red; in *M. alba* it is white. In *Actæa alba* the fruit is white and *A. spicata*, var *rubra*, differs mainly from it in the different color of its fruit.

Even upon so inconstant and evanescent a character as *odor*, we find species occasionally separated, as is the case for example with *Philadelphus coronarius*, which is odorous, and *P. inodorus*, the name of which tells its character.

It is thus seen that even in so uncertain and generally so inconstant a character as color, we have sometimes a distinguishing feature. It is true that it is seldom the *sole* character, but certainly in the cases mentioned above it is the main one.

The Classification of Slight Varieties.

The other day I found near West Cliff in a damp meadow, some specimens of a form of *Sisyrinchium anceps*, differing in no respect from the type, except that the flowers are very pale bluish—so pale as to be almost white. Now this is rather interesting to me, more especially as of late I have been inquiring somewhat into the reasons of color mutations in flowers, and I should like to include it in my catalogue of Wet Mountain Valley plants, now preparing. How am I to enter it? Shall I say "a pale flowered variety?"—if I do, nobody will pay the least attention to it—or shall I call it "var. *pallidiflorum*" and bring upon me a cry of "name such a thing, just a color variety?!" Not that it particularly matters what I do, as the interest at present taken in "slight" varieties is itself slight enough, but suppose (as indeed I do suppose) that after all these slight mutations are quite important, and altogether worthy of study—being the fresh imprint of nature's hand on plastic forms and parts, too fresh and too slight to be permanent, precious to us for their very evanescence, for thereby we know they are the direct result of what to us must be first causes, if the term "first cause," is anywhere admissible. Look at it in this light and it becomes evident that we must no longer omit them from our lists, and that above all things it behooves us to take note of them, and of the circumstances under which they grew, for so shall we learn the beginnings of varieties and of species themselves. So we come back to the original question, how are they to be recorded? Now as to naming—are they to be named? Well, we cannot at all avoid some semblance of a name, if we only speak of "white varieties," and so forth. But science is international, and we have no business to be using English names, and it is exact, or should be, so "white varieties" evidently will not do, as we know that as a matter of fact this term will be applied quite loosely—as it is so often in the case of birds, where an "albino" is often recorded, which we afterward discover to have been a pallid or white-spotted form.

The names, then, must be like other scientific names, international and representing properly defined objects. So much for their general character, but do they follow the rules adopted for specific and other names? For instance, if I find a white-flowered *Campanula*, may I dedicate it to Jones, and call it *Jonesii*? This would hardly do, for the name does not in any way indicate the nature of the form, and nobody wants to associate it with the name of Jones for all time (myself and Jones excepted!) Again, what are these varieties to be called—are they "varieties" in point of fact? We cannot place them on the same footing as geographical races, and well established though not specific forms, and yet it has generally been the rule to rank all forms that were less defined than species under the common term "variety." Rather, these changeable varieties are to be called technically "forms"—a term which, if generally accepted, will likely swallow a good many of the so-called "varieties" of our text-books and periodicals. Therefore, perhaps we may go by two rules:

(1). Classify all plants as species, subspecies, varieties or forms, according to the permanency of their characters.

(2). In naming forms use only names which indicate the nature of the peculiarity, these names to otherwise follow the rules for the names of species.

Further, it would be extremely good if those botanists who are interested would discuss the matter of names, and agree upon a code name to be adopted in every case of certain common varieties—for instance, "*albiflorus*" for a pure white mutation of the flower, in which case the name would be intelligible without the necessity of quoting the author's name.

This admitted, my *Sisyrinchium anceps* becomes f. *pallidiflorum*, since it is clearly a "form" in the technical sense. At the same time, there is room for much difference of opinion as to what is a "form," and it may often take patient observation and experiment to determine the rank of a plant. Mr. C. R. Orcutt tells us, in the last number of his paper, how a yellow-flowered *Mimulus cardinalis* narrowly escaped ranking as a new species, while now it has no name at all, though as a "form" it fully deserves one, and a very interesting form it is, when we remember that throughout organic nature, whether plants, birds, moths or mollusks, red has always a tendency to revert to yellow. What, again, of the *Ranunculus aquatilis* group, with its hosts of so-called species, which Hiern says are formed by the flow of water and like obvious conditions, and comes with mathematics to prove it, while those systematists who listen to him turn away from these plants in scorn, "not even *good* varieties," to them quite abominable because we can know something of their nature?

T. D. A. COCKERELL.

West Cliff, Colorado, July 17, 1889.

Remarks on the Preceding Paper.

The questions which Mr. Cockerell has so forcibly discussed have appealed to all systematists and have yet never been satisfactorily solved. Incidentally, I have given them considerable thought and had gone so far as to introduce the term "forma" into my catalogue of the Plants of New Jersey, now in press, in very much the manner suggested by him, restricting its use, however, not necessarily to variations with but a slight degree of permanency, but to such as we may, perhaps, term physiological rather than structural. Variations in color are one set of these characters; others are to be found in size, in odor, perhaps also the natural doubling of flowers might be recognized in this manner, as this involves a mere transformation of parts and no essential structural differences, although here we are running pretty close to morphological characters; I am not sure, however, that it would be best to rigidly exclude certain of these. The difficulty will be to limit the use of the term to some definite set or sets of characters. If we enforce merely relative permanency we shall all have different views as to what this implies.

The whole subject of the limitation of the various ranks in classification is one which botanists will do well to consider and the pages of the BULLETIN will be open to communications on the topic. By the presentation of different views we might be enabled to reach some valuable conclusions to guide us in subsequent work. The difficulty in restricting the use of "form" is met with in variety, in species, in genus, and, indeed, in every term of our system. Let us have a discussion of the matter, if for nothing else, in order to ascertain just what thoughts are in the minds of botanists of the present generation, for all must have thought more or less about it. Then those of us who meet in Indianapolis will be in a position to talk it over in all its aspects.

I can hardly agree with Mr. Cockerell in the (implied) advisability of changing a published name, however, if a supposed species or variety was to be reduced to a form, for I presume that the trouble that this would give the future student would outweigh the slight advantage of a descriptive adjective; so I should be for forma *Jonesii* of his supposed white harebell if it had been published as *Campanula Jonesii* or *C. rotundifolia*, var. *Jonesii*, for in the future it would make no difference either to Jones or himself, and he would not disturb nomenclature by introducing another adjective, *albiflorus*.

N. L. BRITTON.

The Mandioca.

BY THOMAS MORONG.

In an economic point of view the Mandioca or Manioc is one of the most important agricultural productions both of Brazil and Paraguay. It takes the place of wheat in the northern continent, furnishing the inhabitants with an abundant, cheap and nutritious breadstuff, yielding an enormous quantity of material all the year round. With this the people are independent of the rest of the world for food. Here in Paraguay I do not know how they could get along without it. Corn, or maize, as it is generally called, is indeed raised, but it is a somewhat uncertain crop, and needs more cultivation than the native Paraguayans are disposed to give to anything which requires care. Their chief article of subsistence, therefore, is this wholesome and easily raised root, which the laziest people on earth can have with scarcely any labor.

As found here, the Mandioca is of two forms or species, each of which has several varieties. One of these, which has borne various botanical names, such as *Manihot Aipé*, *Manihot palmata*, *Janipha Loeflingii* and *Jatropha dulcis*, but called by the Paraguayans "*Mandioca dulce*," is the most common. The other, known to the natives as "*Mandioca brava*" (*Manihot utilissima* of botanists), is not so frequently cultivated, though it is often seen in the fields. The sweet Mandioca forms the principal article of diet of the common people, as its roots are entirely innocuous. They may be used as a vegetable for the table, equaling the potato or the parsnip, which they much resemble. Boiled for table use they are white, sweet and palatable. All foreigners take to them at once. They may be fed to animals in the raw state, and are greedily eaten by cattle without injury. They are full of starch ; indeed, that is the ingredient which renders the Mandioca so valuable, and the roots are frequently used as is the potato in our own country, for the manufacture of this important commercial and domestic necessity. The roots are grated or ground into powder, and, after the juice is expressed, dried in the sun or on plates over a fire, and thus made into flour, which forms an excellent bread when baked. The Paraguayan method is to knead the bread with new cheese or ground rice, melted fat, salt, water and a little coriander seed, prepare it in long cylindrical rolls or rings, and bake it in the rounded earthen or brick ovens, resembling huge ant hills, which may be seen in the rear of many of the houses. The bread thus prepared is commonly called "chipa." The chipa bread, if I may be allowed to express an opinion, is, at least when fresh, a delicious article of food. The native women make and sell great quantities of it in the Asuncion market. In the town of Luque, on the Asuncion and Villa Rica Railroad, they are noted for the fine bread which is made of this flour, and the passengers eagerly purchase it from the women who offer it for sale. I have also seen pastry and sponge cake made of the flour as light and palatable as anything prepared from wheat flour, and I do not know why it may not serve all the purposes for which the latter is used.

If the ground powder is heated upon iron plates and partially cooked, it clusters into hard and irregular lumps, and forms the well-known tapioca of commerce, or prepared somewhat differently it becomes the article known in England as "Brazilian arrow-root."

The *Mandioca brava* does not differ much from the *M. dulce* in external botanical characters. Both are stout herbs, growing from five to eight feet high, branching and very foliaceous. Both have their flowers in short axillary racemes, the flowers small, purplish-white and nodding, producing a capsular, 5-valved fruit, and an acrid, milky juice. The leaves of both species are alternate, on long petioles, palmate, with narrow, deeply cut lobes. The natives, however, readily distinguish the two species. *M. dulce,* they say when questioned, has red stems, petioles and leaves, while those of *M. brava* are white. On examination, however, it will be found that this distinction will not always hold good, as *M. dulce* frequently has stems and petioles almost or quite white, while those of *M. brava* are not unfrequently reddish. A much better distinction lies in the shape of the stems, which in the former case are nearly or quite terete, while in *M. brava* they are more or less angled; and also in the angle at which the petioles of the two species spring from the stems, rising in *M. dulce* at a right angle, or even sloping downwards, and in *M. brava* at an angle of sixty or forty-five degrees. After all, the only satisfactory distinction lies in the juices of the two plants. That of *M. dulce*, as already stated, is sweet and innocuous. That of *M. brava,* on the contrary, is *poisonous.* The juice of this species has been known to kill cattle if the roots are eaten in the raw state. If, however, the juice is thoroughly squeezed out, and the grated pulp dried, it may be used in making flour and bread, like that of the other species. Indeed, some of the people here tell me that they prefer the bread made from *M. brava* to that made from *M. dulce.* It makes a lighter bread they say, but I cannot see much difference between them. In Brazil, I believe, the *M. utilissma* is most commonly used in making cassava bread and tapioca, but either species will produce the same result, and certainly *M. dulce* is much the safer of the two. Why two species so closely resembling each other in all external botanical characteristics, growing side by side in the same soil and under the same conditions, should develop such different active principles, is one of the vegetable mysteries which cannot be solved, but that they do is certain. I do not find that the roots of the *M. brava* are ever exposed for sale in the market, though those of *M. dulce* may always be seen in great piles upon the floors and benches of the market-house. The people evidently have a wholesome dread of the poisonous species.

The Mandioca is very prolific. It is grown from slips, and never from seed, so far as I have observed. All one has to do in order to get a field of it is to cut the stem into layers, as is done with sugar-cane, and stick the joints into the ground, where it readily sprouts. I am told that one plant will continue to send out roots for nine or ten years in succession, and even propagate itself in this manner, if not cut off. The roots, which are the only part of the plant used, are from one to two inches thick, and run just beneath the surface of the ground for two or three feet. They have a brownish coat, and a granular, white interior. For table use they are generally taken when about nine or ten inches long, or else broken up into pieces of this length.

I hope to see this valuable garden plant introduced into the United States. I do not see why it may not be easily raised in our Southern States, where the temperature is similar to that of Paraguay. So far as I have observed, the Mandioca (or Cassava, as some persons choose to call it) prefers a light or sandy soil, and a temperature such as the Palmetto or the Orange requires. It is true that Paraguay has a very humid climate, and possibly the Mandioca might not at first thrive in a dry region, but that is a question that can be settled only upon trial. I am quite certain that if it were once known in our country, and all its valuable properties made apparent to the people by successful cultivation and use, it would be esteemed there as here. If it became in the Southern States as common as it is here, it would at once render the common people independent of the Northwestern wheat fields, and furnish them with the cheapest means of living which they have ever known.

Possibly the experiment of raising this root has already been tried in our country. I am ignorant upon that point. But I can see no reason in soil or temperature why it might not be easily cultivated in Florida, Georgia, Alabama, Louisiana and Texas.

ASUNCION, PARAGUAY, July, 1889.

[See an article on this subject by Mr. H. W. Wiley in "Agricultural Science," ii. 256-260 (1880).—ED.]

Botanical Notes.

Note on Harfordia, Greene and Parry. The criticism contained in Botanical Notes, Proc. Cal. Acad. 2d series, i. 235, 236, ostensibly directed against the proposed separation of the genus *Harfordia*, Greene and Parry, from *Pterostegia*, F. and M., may be most satisfactorily answered by quoting the written opinion of the late Prof. Asa Gray in letters addressed to the writer, viz.: In letter of July 12, 1886, before receiving specimens: "As to *Harfordia* no doubt (without examination as to particulars) it is a good genus." In letter of July 19th, after receiving specimens: "I looked at the specimens sent and I should certainly have made a genus of it if it came in my way, *prima facie.* The separation of the sexes, and no involucre to the male, and shrubby stem, should indicate separation." C. C. PARRY.

Utricularia resupinata, B. D. Greene. In a recent examination of the Florida collections of the late Dr. A. P. Garber, I find this species under the name of "*Utricularia purpurea?* Walt. ?" accompanied by the following note: "Grows on low, open, flat ground, which is dry until the wet season (June) and then is covered with water and becomes a pond; flowers very fugacious; plant 1 to 2 inches high." The station at which it was obtained is Manatee, and the date of collection April, 1876. Its occurrence so far south, and on the western coast of Florida, is certainly remarkable. THOS. C. PORTER.

Note on Viola palmata. In the June number of the BULLETIN Dr. Northrop has a note on this species, regarding the irregularity of some of its forms. Its constant abnormal features offer a broad field of observation, for its botanical characters are certainly eminent for a constant irregularity. I have this season met with some remarkable ones, especially in the forma *striata*, which confirms me in the description I wrote several years ago, as follows:

Viola palmata, forma *striata* (streaked or spotted violet.) Four to eight inches high. Leaf cordate, frequently uniform, early ones entire, crenate, purple below near the base and glabrous, later ones becoming more and more clothed with hairs and taking on a lobed form as the season advances, or as the plant creeps up dry hillsides from damp and lower grounds. Flowers few or many, pure white, marked with purple lines or striæ, sometimes sprinkled with purple dots or splashed with large irregular or ragged purple spots, but the lines are always present. Petals vary much as to size and form, even in the same plant, sometimes one or more becomes greatly enlarged, other times one does not fully develop and remains dwarfed. Frequently the margins are irregularly cut, toothed or fringed, later flowers cleistogamous.

Sparingly near Freehold and in the northeastern part of New Jersey, Staten Island, and frequent in the vales and on the gneissic hillsides of Westchester County, N. Y.

I called this form *striata*, unwisely, perhaps, inasmuch as there is a species by that name. But the *striæ* are constant, and it seems to be the only stable character it has, and is therefore eminently expressive. O. R. WILLIS.

Gaylussacia resinosa, var. *leucocarpa*. In a recent number of Garden and Forest there is a note to the effect that plants of white fruited *Gaylussacia resinosa*, sent to the Arnold Arboretum last year by Mr. B. W. Westbrook, of Montague, N. J., bore a small quantity of fruit this season. It is yellowish-white with a pale crimson tinge on the side exposed to the sun. It is sweeter than the normally colored fruit.

A proposed new Genus of Cyperaceæ. In the "Botanisches Centralblatt," xxxix. 73, Herr Otto von Boeckeler describes the genus *Cylindrolepis* as closely related to *Cyperus*. The specimens on which it is based were collected by Dr. A. Rehmann in Natal and the Transvaal, South Africa.

Psoralea esculenta. Dr. T. F. Wilcox, U. S. A., sending specimens of the "Pomme Blanche" states that it is known about Ft. Niobrara, Neb., as "Bread-root," "Tim-chilla" and "Indian Turnip."

Reviews of Foreign Literature.

Structure of the vittæ in the fruit of Umbelliferæ.

In several numbers of the Bot. Zeitung for May and June is a series of short papers by Arthur Meyer on the origin of the partition walls which occur in the intercellular spaces of the fruit of the Umbelliferæ. These cavities are technically known as vittæ and contain the volatile oil which gives the aromatic flavor to many fruits of this order.

It has been noticed by other investigators that these oil cavities were lined by a certain substance, which in some cases has continued through the cavities in the form of partition walls. As the intercellular spaces are not supposed to contain protoplasm, out of which walls may be built in the regular normal manner, the author has undertaken to determine the origin and function of the walls peculiar to these passages. He first gives the morphology and chemistry of the wall as found in ripe fruits. In nearly all cases besides that lining the cavity, partition walls occur. These differ in form and shape in different species. As to their chemical nature, the results of the tests made incline one very strongly to the opinion that they are mainly formed of suberin. The development of the wall is followed from the moment when the secretions from the walls surrounding the cavity are given off in the form of a watery fluid together with tiny oil drops, to the formation of the perfect wall. This watery fluid, he claims, is the foundation of the wall, and that it differs entirely from protoplasm; or as he puts it, from cytoplasma as used by Strasburger. That is, protoplasm without nucleus or chromatophores.

Special emphasis is laid on this point, as various other writers are inclined to consider this secretion as protoplasm which has penetrated the walls and found its way into the intercellular spaces, in the same manner in which the fine threads of protoplasm continue from cell to cell. Among these authors are mentioned Berthold and Russow. In all the experiments tried, it is claimed that the substance of these walls, in both chemical and physical action, appeared entirely unlike protoplasm.

In regard to their biology, he concludes that this is a special arrangement for the preservation of the species. This appears from the fact that the ordinary wall allows these oils to escape very easily. Examples are given where volatile oils escape with great rapidity through the ordinary walls when the fruit first becomes dry. It is well known that the fruits of the Umbelliferæ such as fennel and caraway seeds, as we call them, retain their pungent aromatic odor for a long time, which he claims would be quite impossible were it not for the protection afforded the oil by the suberous nature of the walls in which it is held. Again it is also well known that the oil of these plants has an injurious effect on many insects, birds, etc., when eaten by them. Therefore these suberous walls must be regarded as a special arrangement for the preservation of the species. E. L. G.

Index to Recent American Botanical Literature.

Acacia flexicaulis. C. S. Sargent. (Garden and Forest, ii. 400, fig. 123).

Algæ—The Fresh Water—and their Relation to the Purity of Public Water Supplies. Geo. W. Rafter. (Eng. and Build. Rec. xx. 115, 116-129, 131).

Abstract of a paper read before the Am. Soc. Civ. Eng., May 1, 1889.

Asa Gray. Andrew Taylor. (Trans. and Proc. Edinburgh Bot. Soc. xvii. 346-350).

An obituary notice read before the Edinburgh Bot. Soc., May 10, 1888.

Aster Lindleyanus. (Garden and Forest, ii. 448, Fig. 127).

This fine species has recently been detected in Mt. Desert by Mr. Rand.

Bignonia radicans. L. Greenlee. (Vick's Mag. xii. 270, illustrated).

Catalpa and Paulownia—The Leaves of. A. C. Stokes. (Microscope, ix. 225-231).

Ceanothus, L.—Recent Field Notes, with a Partial Revision of Species. C. C. Parry. (Reprinted from Proc. Davenport Acad. Sci., v. 185-194).

This contribution contains critical notes on *C. hirsutus*, *C. intricatus*, *C. divaricatus* and *C. dentatus*, studied in their home, and descriptions of the following new species: *C. tomentosus*, *C. Lemmoni* and *C. Orcuttii*, all from California.

Contribution a la Flore de l'Amerique Equatoriale. Drake del Castillo. (Journ. de Bot. iii. 237-240).

The following species of *Centropogon* are described as new: *C. erythræus*, *C. gracilis*, *C. reticulatus*, *C. capitatus*, *C. gesneræformis*, *C. hirtiflorus* and *C. pallidus*.

Corema Conradi—Notes on. J. H. Redfield. (Reprinted from Proc. Phil. Acad. Nat. Sci. 1889, 136).

A brief memorandum upon the subject as printed in the BULLETIN for July, 1889.

Cratægus tomentosa. C. S. Sargent. (Garden and Forest, ii. 423, Fig. 126).

Defensive Armor of Plants.—The. Henry de Varigny. (Pop. Sci. Monthly, xxxv. 522-529).

Douglas Fir in Scotland.—The. (Garden and Forest, ii. 454, 455).

Ericaceæ of North America.—Examination of Some of the Poisonous. Alfred J. M. Lasché. (Pharm. Rundsch. vii. 208-213).

Forest Vegetation of the Rio Grande Valley.—The. C. G. Pringle. (Garden and Forest, ii. 393, 394.)

Fraxinus Greggii. C. S. Sargent. (Garden and Forest, ii. 447, Fig. 128.)

Fungi.—I. II. T. H. McBride. (Pop. Sci. Monthly, xxxv. 187-193, 350-359: illustrated).

Genera Desired for the Herbarium of Parke Davis & Co.

A twelve page list of desiderata, issued by the above firm.

Hydrocotyle Americana.—Notes on. Theodore Holm. Proc. U. S. Nat. Mus., 1888, 455-462, Pl. XLVI., XLVII.)

An account of the structure of the tubers sometimes borne by this plant as observed in the vicinity of Washington, D. C., and of the vegetative propagation effected by them and by runners.

The author regards these organs as of far greater importance than the seeds in continuing the plant. The excellent plates illustrate their anatomyand morphology.

Hypericum.—Notes on. J. G. Jack. (Garden and Forest, ii. 450, 451).

Illicium Floridanum. (Garden, xxxvi. 150, 152, Pl. 714.)

Jamaica.—Bulletin No. 14 *of the Botanical Department, July* 1889.

Under the head of Botanical Notes, by W. F., are descriptions of *Tribulus cistoides*, *T. maximus*, *Moringa pterygosperma*, *Ruellia tuberosa* and *Ananas sativa*.

Lauraceæ Americanæ. C. Mez. (Jahrb. König. Bot. Garten und Museum, Berlin, V; three plates).

This exhaustive and truly magnificent monograph of a difficult order of plants comprises 556 octavo pages. The author has personally visited all the larger herbaria of Europe and it was our pleasure to meet him while the Kew specimens were undergoing his investigation. A great number of new species are described and the arrangement of genera adopted differs somewhat from those of recent authors. *Systemodaphne* and *Urbanodendron* are proposed as new, and *Ariba*, Aubl. is taken up as older than *Aydendron*, Nees. No change is made in the status of North American species, but *Persea Carolinensis* (which should be written *P. Borbonia*, for this is the *Laurus Borbonia* of Linnæus) is enriched with forma *glabriuscula* (Pursh), Mez. and forma *pubescens* (Pursh), Mez. Dr. Mez very kindly worked up Dr. Rusby's Bolivian Lauraceæ and they are included in his work, *Ocotea Rusbyi* and *Nectandra Brittoniana* being new species. An account of the morphology and histology of the order is appended. The plates show floral diagrams and morphological details.

N. L. B.

Leucæna pulverulenta. C. S. Sargent. (Garden and Forest, ii. 388, Fig. 122).

Lewisia. A. Paillieux et D. Bois. (Bull. Soc. Nat. Acclimatation, No. 9, 1889, pp. 7, illustrated).

The authors have been investigating the *Lewisia rediviva*, Pursh, on account of its nutritious roots, and have brought together in this contribution all they can ascertain about its habitat, esculent properties, life history and composition. Much of their information has been derived from correspondence with Dr. Valery Havard, and his letters are freely abstracted. An analysis of the root made by Professor Trimble of Philadelphia indicates the presence of much mucilaginous matter and a corresponding deficiency of starch. Common names given for the plant are Chita, Spatulum, Racine amère, Bitter root, Mountain rose. The attention of the French investigators was directed to *Lewisia* by a memorandum in the paper on "Food products of the North Americans Indians," in the Agricultural Report for 1870.

N. L. B.

Lichenes Oregonenses. J. Müller. (Flora, 1889, 362-366).

A list of 81 species collected by Dr. Julius Roell in the Rocky Mountains, Washington Terr., Vancouver and vicinity. *Leptogium corniculatum* (Hoffm.), Minks, var. *barbatum*, is described as new.

List of Plants Collected by Dr. Edward Palmer in Lower California in 1889. Geo. Vasey and J. N. Rose. (Proc. U. S. Nat. Mus. 1888, 527-536). The following new species are described: *Hosackia* (*Syrmatium*) *Watsoni*, *H. Palmeri*, *Ribes Palmeri*, *Applopappus fasciculatus*, *Senecio peninsularis*, *Gilia* (*Siphonella*) *laxa*, *Phacelia* (*Eutoca*) *Palmeri*, *Solanum Palmeri*, *Antirrhinum Watsoni*, *Viguiera microphylla*, *Encelia laciniata*, *E. Palmeri* and *Krynitzkia Grayi*.

Magnolia glauca in its Most Northern Home. J. G. Jack. (Garden and Forest, ii. 363, 364).

A description of its habitat and the plants growing with it in the swamps of Essex Co., Mass.

Rosa Engelmanni. S. W. (Garden and Forest, ii. 376, fig. 121).

Rosa humilis, *Marsh.*, var. *plena.* G. N. Best. (Garden and Forest, ii. 370).

In this communication Mr. Best records the discovery of what is apparently the *Rosa Pennsylvanica plena* of Marshall. He does not consider it as specifically distinct from *R. humilis* and hence proposes the above name.

Smut of Wheat and Oats J. C. Arthur. (Bull. Agric. Exper. Sta. Indiana, No. 28, pp. 23. illustrated).

A description of the fungi *Tilletia Tritici* and *T. fœtens*, the common smut of wheat, and of *Ustilago segetum*, the "black smut" of oats, with an account of the ravages of the pests and the recommendation of measures of prevention and cure. In discussing the name of the wheat smut Dr. Arthur makes use of the following language, which we hail as an indication that at least one of the editors of the "Botanical Gazette" has finally been "converted and absorbed" in the movement for the fixity of original specific names:—"The first person to name the fungus was the Scandinavian botanist, Bjerkander, who called it *Lycoperdon Tritici* (in 1775). In 1854, Tulasne published a fine memoir on the smuts and in it changed the name to *Tilletia caries*. But there are certain laws of priority that all systematic botanists are bound to respect, and when the obscurely published name of Bjerkander was brought to their attention it became necessary again to change the name, making it *Tilletia Tritici*, which is now used by the best authorities." A. being now committed to the proper system of nomenclature, we may venture a hope that both B. and C. will follow in alphabetical sequence if they are still (as in last October), open to conviction. N. L. B.

Stipules in Certain Dicotyledonous Leaves of the Dakota Rocks.—On the Discovery and Significance of. F. H. Snow. (Reprinted from Trans. Kans. Acad. Sci., 1888, illustrated).

An account of stipules in *Betulites Vestii*, Lesq.

Teratology. (Vick's Mag. xii. 281, illustrated).

An instance of median prolification in a rose.

Tigridia buccifera. S. W. (Garden and Forest, ii. 412, fig. 125).

A new species, collected in the mountains of northern Mexico by Mr. Pringle.

Trees of British Columbia.—The. M. Lopatecki. (West Am. Sci. vi. 88-91).

Uniola Palmeri. Geo. Vasey. (Garden and Forest, ii. 402, 403, fig. 124).

A new species recently collected by Dr. Palmer.

Vaccinium hirsutum. C. S. S. (Garden and Forest, ii. 364, 365, fig. 119).

BULLETIN
OF THE
TORREY BOTANICAL CLUB.

Vol. XVI.] New York, November 8, 1889. [No. 11.

The A. A. A. S. Botanical Club's Trip to the Lakes of Muskoka, Ontario, August 31 to September 2, 1889.*

The excursion to Muskoka Lake, to which the Botanical Club of the Association was invited, proved to be one of unusual interest. Probably as many as fifty members of the Association participated. A portion found their hotel accommodations at Port Cockburn, at the head of the lake, and a portion at Port Sandfield, near the center. The weather was faultless.

Muskoka Lake is so irregular in outline and so narrowed in places that it has been found convenient, in local speech, to call its two northerly divisions Lake Joseph and Lake Rousseau, reserving to the southerly portion the name of Muskoka. The lake lies between 44° 50′ and 45° 20′ N. latitude, and between 79° 20′ and 79° 70′, longitude W. from Greenwich. Its level was not precisely ascertained, but probably it is not more than 150 feet above Lake Huron, into which its waters are discharged, at about 740 feet above tide water. Its basin is granitic, the rock forming in many places a precipitous shore. The soil of the country immediately around the shore is very thin, although sufficient to support a forest considerably dense. Fires and the axe have destroyed much of the original timber, but a second growth has already supplied it. Upon the borders of the lake very little ground has been put under cultivation. In fact, there would seem to be but little reason why agriculture should be there attempted. Deer and bear are reported as abundant in places. At Bala, the primitive forest is said still to continue.

The northerly boundary line between the State of New York and the Province of Ontario (40° N. lat.), if extended westerly, would pass through the lake, nearly at its center. The elevations which surround the lake are scarcely more than 100 or 150 feet above its surface. It may be safely inferred from this fact that the mean annual temperature of the Muskoka region is probably not so low as that of the country around Echo Lake in New Hampshire. In fact, Chautauqua Lake, distant two hundred miles to the southward, has a lower mean annual temperature. Few plants characterize the flora of the region which do not also belong to Western New York. The change of the proportions in which the species appear, rather than any change of the species themselves, seem to be the chief indication of its more northerly character. Thus, for instance, although no species of *Betula* was noted at Muskoka, which does not also belong to Western New York, the birches constitute a much larger portion of the forest than they do south of Lake Ontario. On the other hand, although all the maples of Western New York are to be seen in the Muskoka region, they certainly do not constitute so large a portion of the forest as they do in Niagara and Erie Counties, N. Y. There can be no doubt that in this portion of Canada the summers are later and the winters earlier than across Lake Ontario. It is a significant fact that the peach seldom ripens, even in the vicinity of Toronto, whilst in the neighborhood of Hamilton distant only forty miles, it is a fruit maturing almost every year.

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*At the session of the Club held on the steamer returning to Toronto, Monday September 1, a committee was appointed, consisting of Hon. David F. Day, Prof. T. J. Burrill and the editor of the BULLETIN, to prepare a report on the excursion The senior member of the Committee has prepared the report which is here. submitted.

The more noteworthy plants which were observed in the excursion were mainly aquatics: *Subularia aquatica*, *Elatine Americana*, *Lobelia Dortmanna*, *Utricularia intermedia*, *Limnanthemum*, *Eriocaulon septangulare*, and an *Isoetes*, probably *I. Braunii.* Notwithstanding the diligence of the Canadian botanists, all these plants were new to the Province of Ontario. They are not to be regarded as very abundant in the places of their discovery. Among terrestrial plants which arrested attention, *Polygonum tenue*, found growing upon rocky hillsides, and *Aster nemoralis* were the most important. The *Subularia* and *Elatine* were found growing under water, upon a sandy bottom, (Slater's Bay, near Port Sandfield) and were looked for elsewhere in vain.

The following list embraces all the plants which were reported to the Club as having been observed:

Clematis Virginiana,	Port Sandfield.
Anemone Hepatica,	Toronto.—J. T. Cowell.
Anemone acutiloba,	Port Sandfield.
Ranunculus Pennsylvanicus,	“ “
Ranunculus acris,	“ “
Coptis trifolia,	Frequent.
Brasenia peltata,	Port Sandfield.
Castalia odorata,	“ “
Castalia tuberosa,	Toronto.
Nymphæa advena,	Common.
Sarracenia purpurea,	Port Sandfield.
Cardamine hirsuta,	Lake Rousseau.
Camelina sativa,	Gravenhurst.—Thos. Meehan.
Corydalis sempervirens,	Port Sandfield.
Drosera intermedia,	“ “
Elatine Americana,	“ “
Silene noctiflora,	“ “
Silene antirrhina,	“ “
Geranium Carolinianium,	Port Cockburn.—Mrs. M. L. Moody.
Geranium Robertianum,	Port Sandfield.
Rhus typhina,	Toronto.
Rhus Toxicodendron.	Toronto.
Vitis æstivalis.	Port Sandfield.
Acer Pennsylvanicum.	“ “
Acer spicatum.	“ “
Acer saccharinum.	“ “
Acer saccharum.	“ “
Acer rubrum.	“ “
Trifolium repens.	“ “
Trifolium hybridum.	“ “
Trifolium procumbens.	Toronto.
Melilotus officinalis.	R. R. track bet. Toronto and Gravenhurst
Melilotus alba.	“ “ “ “
Medicago lupulina.	Gravenhurst.
Prunus Pennsylvanica.	Port Sandfield.
Prunus serotina.	Toronto.
Spiræa salicifolia.	Port Sandfield.
Geum Virginianum.	“ “
Potentilla Norvegica.	“ “
Potentilla palustris.	“ “
Rubus villosus.	“ “
Pyrus Americana.	Frequent.
Pyrus arbutifolia,	
var. *melanocarpa.*	Port Cockburn.
Amelanchier Canadensis.	
var. *oblongifolia.*	Port Sandfield.
Ribes Cynosbati.	“ “
Saxifraga Virginiensis.	“ “
Epilobium spicatum.	Between Toronto and Gravenhurst.

E. palustre, var. *lineare.*	Port Sandfield.
E. coloratum.	Toronto.
Rhexia Virginica.	Bala.—Rev. Mr. Bragdon.
Micrampeles echinata.	Port Sandfield. Perhaps not indigenous.
Cicuta bulbifera.	Gravenhurst.
Aralia hispida.	Port Sandfield.
Cornus stolonifera.	Frequent.
Cornus circinata.	Port Sandfield.
Cornus Canadensis.	" "
Linnæa borealis.	Lake Rousseau.
Diervilla trifida.	Port Sandfield.
Sambucus Canadensis.	" "
Sambucus pubens.	" "
Viburnum lantanoides.	Lake Rousseau.
Viburnum acerifolium.	Port Sandfield.
Galium circæzans.	" "
Mitchella repens.	Lake Rousseau.
Eupatorium ageratoides.	Port Sandfield.
Aster corymbosus.	" "
Aster macrophyllus.	" "
Aster paniculatus.	" "
Aster lævis.	" "
Aster Novæ Angliæ.	Toronto.
Aster nemoralis.	Port Sandfield.
Aster umbellatus.	" "
Erigeron Canadensis.	" "
Erigeron ramosus.	" "
Solidago bicolor.	" "
Solidago hirsuta.	" "
Solidago nemoralis.	Between Toronto and Gravenhurst.
Solidago Canadensis.	Port Sandfield.
Solidago lanceolata.	Toronto.
Ambrosia artemisæfolia.	"
Helianthus decapetalus.	"
Bidens frondosa.	Port Sandfield.
Bidens connata.	Gravenhurst.
Anthemis Cotula.	Toronto.
Achillæa Millefolium.	Port Sandfield. White and pink-flowered; the European form at Toronto.
Chrysanthemum Leucanthemum.	Between Toronto and Gravenhurst.
Artemisia Canadensis.	Near Toronto.
Artemisia biennis.	Toronto.
Erechthites hieraciifolia.	Lake Rousseau.
Cnicus lanceolatus.	Gravenhurst.
Lappa officinalis.	Between Toronto and Gravenhurst.
Hieracium Canadense.	Port Sandfield.
Prenanthes alba.	" "
Taraxacum Dens-leonis.	Toronto and elsewhere.

Sonchus arvensis.	Toronto.
Lobelia Dortmanna.	Port Sandfield.
Oxycoccus macrocarpus.	" "
Vaccinium Pennsylvanicum.	" "
Vaccinium Canadense.	" "
Cassandra calyculata.	" "
Pyrola secunda.	Near Port Cockburn.
Chimaphila umbellata.	" Toronto.
Ilex verticillata.	Port Sandfield.
Nemopanthes mucronata.	Gravenhurst.
Plantago major.	Toronto etc.
Plantago Rugelii.	Port Sandfield.
Plantago lanceolata.	Toronto.
Lysimachia terrestris.	Port Sandfield.
Lysimachia quadrifolia.	Near Toronto.
Limnanthemum lacunosum.	Lake Muskoka.
Utricularia intermedia.	Port Sandfield.
Utricularia cornuta.	" "
Verbascum Thapsus.	Gravenhurst.
Linaria vulgaris.	"
Verbena hastata.	Near Toronto.
Verbena urticifolia.	" "
Phryma Leptostachya.	Port Sandfield.
Mentha Canadensis.	" "
Calamintha Clinopodium.	" "
Brunella vulgaris.	" "
Scutellaria lateriflora.	Lake Rousseau.
Echinospermum Lappula.	Gravenhurst.
Phytolacca decandra.	Near Toronto.
Chenopodium album.	Various places.
Chenopodium hybridum.	Port Sandfield.
Amarantus retroflexus.	Gravenhurst.
Polygonum Persicaria.	Port Sandfield.
Polygonum Pennsylvanicum.	" "
Polygonum tenue.	Rocky hill near Port Sandfield.
Polygonum cilinode.	Port Sandfield.
Sassafras officinale.	Near Toronto.
Shepherdia Canadensis,	Various places.
Euphorbia Helioscopia.	Toronto.
Ulmus Americana.	Near Toronto.
Quercus rubra.	Frequent.
Quercus palustris.	Near Toronto.
Quercus alba.	Port Sandfield.
Fagus ferruginea.	Near Toronto.
Corylus rostrata.	Port Sandfield.
Myrica Gale.	Lake Shores.
Betula lutea.	Port Sandfield.
Betula papyracea.	" " and elsewhere.
Alnus incana.	Gravenhurst and Port Sandfield.

Salix cordata,	Gravenhurst.
Salix lucida.	Port Sandfield.
Populus tremuloides.	" "
Populus grandidentata.	Frequent.
Populus balsamifera.	"
Pinus resinosa.	Lake Joseph.
Pinus Strobus.	Port Sandfield.
Picea Mariana.	Near Toronto.
Larix laricina.	Port Sandfield.
Thuja occidentalis.	Frequent.
Potamogeton natans.	Lake Rousseau.
Alisma Plantago.	
var. *Americanum.*	Gravenhurst.
Habenaria bracteata.	Port Cockburn.
Smilax herbacea.	Port Sandfield.
Medeola Virginica.	" "
Trillium grandiflorum.	" "
Trillium erythrocarpum.	Frequent.
Clintonia borealis.	Lake Rousseau.
Unifolium Canadense.	Port Sandfield.
Juncus pelocarpus.	" "
Juncus bufonius.	" "
Juncus Canadensis.	" "
Pontederia cordata.	Lake Rosseau.
Eriocaulon septangulare.	Port Sandfield.
Scirpus validus.	" "
Scirpus atrovirens.	" "
Phleum pratense.	" "
Muhlenbergia sylvatica.	Gravenhrust.
Brachyelytrum aristosum.	Port Sandfield.
Oryzopsis asperifolia.	" "
Danthonia spicata.	" "
Bromus Kalmii.	Port Sandfield.
Phragmites communis.	Near Toronto.
Triticum violaceum.	Port Sandfield.
Elymus Canadensis.	" "
Deschampsia flexuosa.	Toronto.
Panicum filiforme.	"
Panicum capillare.	Port Sandfield.
Setaria verticillata.	" "
Equisetum palustre,	" "
Polypodium vulgare.	" "
Adiantum pedatum.	" "
Pteris aquilina.	" "
Phegopteris Dryopteris.	Bala.—Rev. Mr. Bragdon.
Aspidium marginale.	Port Sandfield.
Woodsia Ilvensis.	" "
Lycopodium annotinum.	Lake Rousseau.
Isoetes Braunii.	Port Sandfield.

The new Locality for Subularia aquatica, L.

By David F. Day.

This plant, described by Linnæus from Scandinavian specimens, is probably to be found in all the northern portions of Europe, including Great Britain and Ireland. Whether or not it has been observed in northern Asia, I have, at present, no means of determining; but as plants of such high latitudes are apt to be widely distributed, it probably may be found in Siberia and Kamtchatka. As yet, however, it seems not to have been noticed in Alaska.

Its first discovery in America was by Nuttall. Specimens with his label, accrediting it to "lakes in Maine," are in several herbaria. This was probably between 1830 and 1840.

In 1844 Professor Tuckerman discovered the plant at "Echo Lake, Franconia, N. H." Some time later William Oakes also found it there; and later still, after the failure of many botanists to collect it, in September, 1882, it was rediscovered, in the same locality, by Annie Trumbull Slosson. Her interesting account of it may be read in the 11th vol. of the BULLETIN, at page 118.

A third American locality was found on the 13th September, 1882, by Professor Fletcher, at Vermilion Bay, Eagle Lake, C. P. R., Dawson's Route. See Macoun's Catalogue of Canadian Plants, Vol. I, p. 55.

Since then it has been collected by Bolander, "in pools in Mono Pass on the upper Tuolumne River," in California, by Dr. Parry "at the head of Yellowstone Lake," by Professor Jones in Wyoming Territory, and by C. G. Pringle in Summit Lake, California, by Professor Jos. Schrenk at Squam Lake, New Hampshire, and by Professor Macoun at Sproat Lake, Vancouver.

To these localities Muskoka Lake, Ontario, must now be added, as the tenth American station, where it was found on the first of the current month. The precise spot was along a sandy beach on the northeast side of Slater's Bay, near Port Sandfield.

Probably in all the places, where it has been detected, it grows abundantly; but the localities are so widely scattered and so far out of the lines of ordinary travel, that the species must still be regarded as one of the rare plants of the western continent. There would seem, however, no obvious reason why it may not be found in the waters of northerly Vermont, New York, Michigan or Minnesota. In fact, its detection in Chautauqua Lake should not be regarded as very singular. It may be reasonably looked for wherever such plants as *Eriocaulon septangulare* and *Lobelia Dortmanna* are present.

Since the Muskoka discovery, I have received from my friend, Mr. Meehan, of Germantown, Pennsylvania, a note, mentioning the fact that, in the herbarium of the Academy of Natural Sciences at Philadelphia there are thirteen specimens of *Subularia aquatica*, and with them a label, (intended for one of them), which reads, "The Delaware River, Elias Durand." Below, in the handwriting of Mr. Redfield, are the words, "For all this positive statement of Durand, I doubt whether he got it there. No one else has found it there." One of the thirteen specimens Mr. Meehan regards as very different from the rest. He writes:—"The stem is flexuous where the pedicels connect and the pedicels themselves coarser in every way. This difference does not seem to have attracted Mr. Redfield's notice, and it looks, for all the world, like one who grew away from its home centre—possibly the Delaware." A pen-and-ink sketch accompanies the statement and shows the plant to be very peculiar in its habit.

Prior to the receipt of Mr. Meehan's letter, I had noticed the fact that, for so small a plant, the Muskoka specimens presented among themselves, one remarkable variation. Few of the specimens were more than one-flowered. I think no one had more than three. The scapes of the one-flowered specimens were surely much thicker and heavier than of those which were two- or three-flowered. In this respect they also differed greatly from the Oakes specimens, of which I have two or three, and with which I carefully compared them.

The conclusion which I draw from all these facts is this: there should now be an ample collection of specimens from all the known localities and a careful comparison made of them with those in the eastern herbaria. As suggested in Mrs. Slosson's article, the time of flowering given by Gray—"June and July"—is much too early. Hence, no doubt, the repeated failures of botanists to re-discover the plant in Echo Lake and elsewhere. Probably late in August or early in September the plant may be fonnd in better condition and larger numbers. In the Muskoka specimens I found only one in which the valves of the silicle were shed.

BUFFALO, Sep. 23d, 1889.

The Wave Growth of Corydalis sempervirens.*

One of the most interesting of the new facts observed by me on the trip to the Muskoka Lakes was what I may term a recoil in the wave growth in *Corydalis sempervirens*† which I believe is so far without a parallel. I remarked a few days ago before the Association, that growth in plants was not by slow and regular modification, but in rhythms or waves, and that it was the varying intensity of these waves that largely influenced those variations that gave character to genera and species. So far as I have gone, I have noticed but a flow and a reflex action. In *Compositæ*, for instance, the flower buds were formed at the base of the branchlets of the panicle, and which after reaching a certain size, slept as it were until the terminal bud was formed, and then the advance wave flowed downwards, awakening the flower to renewed growth and perfect bloom. This was especially observable in *Liatris*. In this *Corydalis* there was a similar formation and sleeping of the buds, till the apical bud was reached, which kept on without resting till fully formed and the seed vessel went on the road to maturity. Instead, however, of the next in order downward being started into a renewed growth, as in *Compositæ*, it was the lower on the five-flowered raceme that started the second growth wave, when the other three upwards, successively followed. The relative length of the immature seed vessels showed that the apical flower, or No. 5, opened first, which was followed by the lowest as No. 1, then No. 2, 3, and 4.

In the Fig. 179, Botanical Magazine, this arrangement is faithfully given by the artist, though it has been left to our time to note it, and to discover its significance.

THOMAS MEEHAN.

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*Read before the Botanical Club, A. A. A. S., at the Toronto Meeting, September 1, 1889.

† *C. sempervirens* (L. 1753). Pers. 1806 ; *C. glauca*, Pursh. 1814.

Pinus Banksiana on the Coast of Maine.

By Edward L. Rand.

This peculiarly northern species has its province thus defined in Professor Sargent's Report on the Forests of North America; "Bay of Chaleur, New Brunswick, to the southern shores of Hudson's Bay, northwest to the Great Bear Lake, the valley of the Mackenzie River, and the eastern slope of the Rocky Mountains between the fifty-second and sixty-fifth degrees of north latitude; south to northern Maine, Ferrisburg, Vt., the southern shores of Lake Michigan and central Minnesota." Gray's Manual credits it to "N. Maine, N. Michigan and Wisconsin, and northward."

In August, 1882, Mr. Frank M. Day, of Philadelphia, showed me an undoubted specimen of this pine which he had found on the summit of Schoodic Mountain, in the town of Gouldsboro, on the eastern side of Frenchman's Bay, a point far to the south of its hitherto accredited province.* Some years passed before it was convenient to gratify my desire of visiting this locality, but in August, 1885, in company with President Eliot of Harvard University, his son, Mr. Charles Eliot, and other friends, I was enabled to accomplish my wish. Landing at a little cove a short distance south of Winter Harbor, Schoodic Mountain lay a mile or more south of us, across a low, thinly wooded, somewhat boggy plain. Wood paths led towards the mountain down along the west coast of Schoodic Peninsula, through groves of spruce. Following one of these paths for about half a mile, we suddenly came upon the object of our search, before reaching the mountain. It was a straight handsome tree of at least twenty feet in height, easily recognized by its peculiar dark green, short foliage, and its abundant curved cones. Other trees were soon seen, both large and small, showing that this pine is not limited to the mountain, but might confidently be expected over the entire peninsula. Proceeding towards the mountain we saw here and there more of it. Crossing a well traveled wood road which apparently traverses the penin-

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*The locality at Ferrisburg, Vt., quoted by Professor Sargent above, on the authority of R. E. Robinson, is equally exceptional being in about the same latitude as Schoodic Peninsula. It is well here to add that I have been informed that there is a single tree of *Pinus Banksiana* at Bucksport, Me., on Penobscot River, a few miles below Bangor. I have never verified this statement, however.

sula we reached the gentle northern slope of Schoodic Mountain. Its summit is very similar to the summits of Mt. Desert mountains,—bare rock with thickets of alder, *Viburnum cassinoides* and red oak,—but where I should have looked for dwarfed spruces or for *Pinus rigida*, I found *Pinus Banksiana* instead. Strange, weather-beaten, dwarfed shrubs they were, twisted into many a fantastic shape along the wind-swept summit, and very different from the handsome trees we had seen below. Descending the western cliffs of the mountain we returned to our starting point by a wood path running near the western coast, and here we saw very little of the *Pinus Banksiana*, showing that it is more abundant towards the eastward in the interior of the peninsula.

This unreported coast station of *Pinus Banksiana*, so much farther south than hitherto known, has always had great interest for me in connection with the studies upon the flora of Mt. Dessert in which I have for many years been engaged. The locality is separated from Mt. Desert Island by a bay not over five miles in width, yet up to the present time no observer has seen even a single tree of *Pinus Banksiana* upon that island.

Pinus Banksiana with Corema Conradii.

By John H. Redfield.

When Mr. Rand a year or two ago mentioned to me the existence of *Pinus Banksiana* upon Schoodic Peninsula, I was very desirous to visit the locality, and on the 24th August last I was enabled to do so in company with Mr. Theodore D. White, a member of the Agassiz Club of New York. At that time I had not the benefit of Mr. Rand's notes as given above, and ignorant of the topography, we were obliged to make our search very much at random. From Winter Harbor we drove by the road which crosses to the *eastern* side of the peninsula and then turns southerly till it terminates in a farm. Long before reaching this terminus we passed through a forest composed almost exclusively of *Pinus Banksiana*, the trees reaching to the height of at least twenty or thirty feet. Occasionally a spruce or arbor vitæ appeared

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Note.—Since the above was written I have received a letter from Mr. Day, correcting me in one important particular He states that his specimen of *Pinus Banksiana* came from Prospect Harbor, Goldsboro, a station lying on the eastern shore of the Schoodic Peninsula, not on the western shore where I found this pine. My discovery of it both there and on Schoodic Mountain appears, therefore, to have been the fortunate result of a misunderstanding. Mr. Day's station was evidently somewhere north of the station discovered by Mr. Redfield.

but for the most part this pine seemed to have displaced the usual coniferous growth of the Maine coast. Its very short leaves give the tree somewhat the aspect of a spruce, but its less conical form, and the bunching of the leaves towards the extremity of the twigs, after the usual manner of pines, render it easy to recognize even at a distance. We continued to see more or less of this pine, until our road brought us out of the woods. An attempt to follow a wood path to the summit of Schoodic Mountain was frustrated by want of time. But Mr. Rand's article above shows that our two separate visits covered both sides of the peninsula as well as the mountain itself (427 feet in height). We may therefore safely conclude that this peculiar species abounds over the whole peninsula. The locality is the most southern one on record, being in latitude about 44° 20′. Mr. Lindsay, an intelligent resident of the vicinity, told me that he knew of its existence at intervals to a distance of at least twenty-five miles northward. It would be interesting to know what degree of continuity there may be between these localities, and the larger areas in northern Maine.

While gazing at the trees of *Pinus Banksiana* we were surprised at finding ourselves in the midst of a remarkable station of *Corema Conradii.* This plant was growing most abundantly in the open, rocky glades among the pines, and seemed to cover every spot where there was sufficient earth to support it. One of these glades was about 250 feet in length by 125 feet in width, and another of nearly equal extent was also covered more or less with patches of *Corema*, and probably we did not see its utmost limits. Wherever the glades were closed by a more compact growth of pines the *Corema* disappeared, and was replaced mostly by *Vaccinium Pennsylvanicum.* In the localities of *Corema* farther west and south which I have seen, the accompanying tree growth has usually been of *Pinus rigida*, but evidently this little shrub is equally at home with *Pinus Banksiana.**

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*I may here state that Mr. T. G. White has recently found *Corema* upon the summit of Mt. Batty, near Camden, Me., where Prof. Chickering saw it in 1859 and 1860, and where it eluded my search in 1885. Three new localities have been revealed upon Mt. Desert I.; one upon Beech Mountain, where it has been seen by Mr. Rand; another near Ship Harbor, east of Bass Harbor, seen by Mrs. Annie S. Downs; and the third upon Beech Cliff, east of the locality first named, seen there by Mrs. L. R. Boggs. The locality on Beech Mountain is especially interesting, as the mountain is rarely visited by anyone.

Notes on Some Botanical Reading Done in the Laboratory of Prof. Schwendener in Berlin, in June and July, 1889.*

By Emily L. Gregory, Ph. D.

This botanical reading, as it is termed in the heading of my paper, was not undertaken with an object of studying any one line of work, but rather with that of acquainting myself with the principal botanical work which has occupied the northern botanists of Germany since the year 1886, and more especially during the latter part of that time.

One of the first subjects taken up was that of Mycorhiza. A point of interest for me in this was the summary manner in which Prof. Schwendener disposes of the question of symbiosis among plants. One of the first elaborate papers on the Mycorhiza is that of Prof. Frank, published in the "Berichte der deutschen botanischen Gesellschaft" in 1885. This publication called forth comments from several authors claiming priority of discovery. Prof. Woronin claims that the principal facts given in this paper of Frank's were published some time previous by Herr Kamienski, in an an article on *Hypopitys Monotropa*. Rees has an article in the same journal in which he says a fungus, very similar to the one described by Frank, was discovered and named by him, *Elaphomyces*. However this may be, it is beyond controversy that Frank is the first one to give a detailed account of this singular growth. He defines the term Mycorhiza as the "peculiar organ of the root of the family Cupuliferæ and some other plants, which organ is formed by a union of fungus hyphæ and the root itself." The other plants referred to here are some of the Conifers and a few of the Ericaceæ.

As is very well known, the organ of the plant for obtaining nourishment from the soil is the root hair. These hairs occur at a short distance back of the growing tip of the rootlets, forming a little zone of varying width around the young root. They die off as the root extends itself in length, new ones springing out near the tip, so that these real food organs of the plant are constantly being renewed as the young rootlet grows in length only from the tip. In those plants where the Mycorhiza occurs no such root hairs develop. We are not at liberty to infer from this that the plant has lost the ability to produce them, because what occurs after the germination of the seed would prevent the young epidermal cells of the root from extending themselves into hairs after the normal method.

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* Abstract of a paper read before the Club, Oct. 23d.

What happens really is this: Shortly after the development of the little roots, and before the time for the root hairs, a fungus hypha attaches itself to the young root not far from the tip. This hypha thread, after fixing itself firmly to the root, grows with great rapidity, branches and rebranches, winding itself about the root and forming a complete network around it. As it increases in age it forms a so-called pseudo-parenchymatic tissue, by means of numerous partition walls. This new tissue, encasing the root, is small celled, thin walled and smooth on its surface, except that hyphæ are sent out from various parts which extend into the soil, fasten themselves upon the little particles in exactly the same manner as the real root hair. As the growing tip of the root prolongs itself, thus developing a new, fresh surface not covered by the fungus, new branches grow out from the parts nearest the tip, and after a time grow fast to this as in the older root. So there is always a little part of the growing root tip free from the fungus, and always a little zone around which the fungus is coiling, but has yet no genetic connection with the root.

Back from this zone the fungus hyphæ are grown fast to the epidermal cells, penetrating the walls and entering into the side walls of these cells, but never into their lumen. As Frank describes it, the fungus hyphæ are grown fast to the tissues of the root just as the hyphæ of the lichen are grown fast to the Algæ. This combination of fungus hyphæ and root has been named Mycorhiza or fungus root. This curious instance of parasitism, or whatever name may be given it, has excited no little discussion on the part of the professors forming the society known as the Deutschen Botanischen Gesellschaft, at Berlin. Frank, who is professor in the Landwirthschaftliche Hochschule, or agricultural college, is inclined to take the extreme view, and actually goes so far as to claim that the lofty tree, with its sweeping branches laden with innumerable little work shops for the manufacture of carbo-hydrates, is, after all, nothing but a parasite on the microscopic fungus hidden in the ground below. That this is an extreme view may easily be recognized when the real facts, which are known to be facts, are taken into consideration. That the plant has no other means of getting nourishment from the ground than through these hyphæ is a known fact. But on the contrary, nothing is known of the true nature of this food when given over to the plant. If it were proven that the fungus takes up elaborated food from the humus in which it is found, and passes that food over to the tree, it could not then be considered the host from which the tree gets its living, but only the conductor of food. It is conceded by even the most conservative that the tree may obtain some elaborated or energized food in this way; but the real idea of parasitism includes a greater dependence of the parasite upon its host, or rather a different kind of dependence than this, namely, a plant living upon another, by taking the food which is elaborated by this plant for its own purposes.

Now, in the Mycorhiza it is not known even that the tree receives food drawn from the humus through the hyphæ. That this is presumably the case adds nothing to substantiate Prof. Frank's statement that the beech tree is a parasite.

In regard to the point about the lack of the root hair, the statement made is correct so far as actual experiments have been tried. Yet it would not be at all surprising if an experiment should show that the plant had lost its power of producing root hairs. The general law of inheritance is, that a plant possessing an organ whose function is usurped by that of some other organ, extraneous or otherwise, in the course of generations loses its power to develop this organ. There is no question but that some very interesting biological facts are yet to be discovered in this field. The relationship between plants of different groups, which has been conveniently named Symbiosis, has been proven to be of so varied a nature that the word itself has scarcely any definite meaning. In the earlier history of this word, in its application to botany, some botanists tried to limit its use to that relationship by which two plants of different groups are genetically connected with each other, neither being injured by this connection, and either one or both receiving therefrom a positive gain. The difficulty here seems to be that it is impossible to say whether an injury is done to the plant or not. Prof. Schwendener, in discussing the question, gave for an example the lichen. Some botanists assert that the presence of the fungus, instead of retarding the development of the alga enclosed, is conducive to its growth and development. This statement, he claims, is not substantiated by fact. Who can say that it is not an injury to the alga that it has lost its power of sexual reproduction? It is quite true that while it has lost in this way, it has gained in ability of vegetative propagation. It is a point which no scientist has yet been able to determine, that is, to exactly balance the gains and losses so that it is possible to say whether the alga would have reached a higher stage of development had it not been made use of by the fungus. Prof. Schwendener summarily disposes of this question by declaring that the word Symbiosis may be applied to any combination of individuals for mutual benefit.

Another question, and one including a far wider range than this, goes back practically to the old one, "do plants make use of the free nitrogen of the air?"

This old question comes up in new forms, and like many other old questions seems only to increase in difficulty as it increases in age.

In a certain form of this subject Frank also plays a very prominent role as investigator. A word here in explanation of the fact of so many subjects taken up him.

He holds a prominent position in this agricultural college, and the question of adaptation of crops to soil in Germany is one of great practical importance. Therefore the authorities, or those in charge of this institution, claim from the professors engaged in it, a certain amount of work in practical directions. This has led Prof. Frank to take up questions bearing decidedly on the chemical side of plant physiology. As he is not himself a practical chemist, he employs one in his laboratory to make his most important and finest chemical tests.

In respect to the form in which this question is now being worked over in Berlin, there is one branch of it which seems to me may be of interest, though, of course, the subject is too broad to be treated only in the most general way.

This branch is included in the peculiar characteristic of the Leguminosæ, which renders them able to produce more nitrogen than plants of other families. I may be excused here for bringing together a few statements probably familiar to you, but which will serve to make clear the relation of this question to the general one, as to the source of nitrogen for the plant.

In nearly all text books in physiological botany, it is claimed that green plants get their nitrogen chiefly from the soil in the form of nitrates. The principal authority on which this rests is the experiments of Boussingault, made forty years ago. These experiments have never been refuted, although many other scientists have reached conclusions directly opposite to those of Boussingoult. For example, Ville, in Paris, claims to have proven that certain plants do take part of their nitrogen supply from the free nitrogen of the air. Lawes and Gilbert, of England, on the other hand, claim that the evidence given of this is not sufficient, in short, they claim to have disproved the conclusions reached by Ville. Many others have experimented in this field, but among the conflicting opinions we may select one or two that have been decided by general consent to rank as facts. These are, 1st, that the plants of the family Gramineæ obtain their nitrogen mostly from the soil, and that the amount of nitrogen produced by these plants is in direct proportion to that of the soil where they grow. Second, plants of the family Leguminosæ, without regard to the amount of nitrogen in the soil in which they grow, produce two or three times as much in their fruit as do the family Gramineæ. These facts are so far recognized, that the Leguminosæ are called nitrogen producers, the Gramineæ, especially the cereals, nitrogen consumers.

This brings us to the subject at once, with the question: If there is no direct relation between the amount of nitrogen in the soil and that found to be produced by the plant, where does the plant get it? If from the air, is it in the form of free nitrogen or as ammonia?

Many of the family Leguminosæ are supplied with peculiar tubers on their roots, and it seems quite well authenticated that there is some connection between these tubers and the production of nitrogen. Under the direction of Prof. Frank, Brunchoist took up the study of these tubers. He says of their history they have been considered everything possible for such a part of a plant to be, viz.: insect-galls, sclerotia, lenticels, vegetative buds, (which under certain circumstances might grow out,) fungus-galls and finally as albumin builders and reserve holders. This latter view is the one supported by Brunchoist, based upon the result of his experiments and study under Frank. He considers them as normal outgrowths of the plants. Woronin, who studied these bodies previous to the work done by Brunchoist, discovered that in the parenchymatic cells of these tubers were little bodies resembling bacteria. Also in certain cells he found fungus hyphæ, but never in the same cell containing the bacteria-like bodies.

Now Brunçhoist claims that he has discovered the origin of these little bodies, that they develope out of the living protoplasm of these cells and are not bacteria, but gives them the name bacteroiden, or bacteria–like bodies, having the form but not the function of bacteria. He claims that their function is to supply the plant with nitrogen, later detected in its nitrogen-holding fruit, and that they dissolve and are passed upward in the sap-current to the upper part of the plant.

While these investigations have been going on in Berlin other botanists have by no means remained idle. Hellriegel, who is well known in this controversy, takes a position opposing Frank, and contrary to the conclusions of Brunchoist.

In the Berichte of June 25th is an article by Frank, in which he gives about the sum of Hellriegel's opinions as follows: Hellriegel claims to have proven by his experiments that the Leguminosæ find in the free nitrogen of the air a source of food which the Gramineæ cannot make use of. The Leguminosæ have not however, of themselves, the power to assimilate this free nitrogen, but that they depend on the aid of certain "Mikro-organismen" to accomplish this act of assimilation for them, and that these organisms live in a *symbiotic* relation with these leguminous plants.

In other words, Hellriegel believes that these little bodies are really bacteria, and that they have the power to make use of the nitrogen, that they work it over into a form which the plant can use, and it is appropriated by these tuber-producing plants.

On the other hand, Frank holds that the experiments of Hellriegel do not bear out this conclusion, that the ability of plants to assimilate free nitrogen is much more extended than the experiments of Hellriegel lead us to suppose. He has nowhere given so clear and succinct a statement of his conclusions as Hellriegel, but he claims that the fact of the Leguminosæ producing more nitrogen than any other plants proves nothing in reference to their need of any special organ for this purpose. He lays much stress on the fact that at certain periods of their life they do not assimilate more nitrogen than other plants; for example, before blossoming they assimilate much slower than after that time up to the ripening of their fruit. This he gives as a possible solution of the Boussingault experiments, namely, that they were made at such a time in the development of the plants when they were not using much nitrogen. Again he argues: it is admitted that some plants have a greater power of assimilating CO_2 than others; why not also a difference in regard to nitrogen? Furthermore, he claims to have proven that plants belonging to other families than the Leguminosæ, as certain Cruciferæ, Gramineæ and some Algæ, in none of which these tubers occur, have yet the power to use free nitrogen of the air. He says that it has not been proven that these bacteroidea are able to assimilate nitrogen, but that this is known to be the part of the green plant.

Frank appears opposed to nearly all the botanists now at work at this question and those involved in it, in these two particulars. He holds that more plants assimilate free nitrogen than those having these peculiar tubers and belonging to the family Leguminosæ, and also that these little bodies, discovered by Woronin, are the normal product of the plant, and have no connection whatever with any outside organism.

Now the next step in this interesting question follows very naturally. This is: Do bacteria act in the process of changing the ammonia of the air into nitrates? This question, like many other physiological ones, has long been the study of chemists. Once proven that this is the case, that bacteria are the means by which some of the inorganic material of plant food is rendered fit for their use, and we have another important link in the chain which binds together all living organisms. This would also go far to substantiate the theory that the tubers of the Leguminosæ are caused by bacteria extraneous to the plant itself.

One side point in connection with the tubers of Leguminosæ may be of interest. In a number of the Berichte of 1887 is a long article on this subject by Tschirch, also a member of this agricultural college in Berlin. In this article he speaks of the notion of Brunchoist that these bacteria-like bodies originate directly from the protoplasm of the cell, and adds that this idea was also maintained by Prof. Wigand, of Marburg, in a paper, not at that time published, on "The origin of bacteria in the closed plant tissues of the root tubers of Papilionaceæ." He also adds that although Prof. Wigand agreed with Brunchoist as to the origin of these bodies, he differed widely from all other scientists in the construction he put upon this supposed fact. It so happened that I was passing through Marburg at the time Prof. Wigand was engaged in this study, and, at his request, I remained over one day to watch the development of these supposed bacteria in certain root tubers then being studied by him. The plant was *Adoxa Moschatellina*. Since that time his unfinished papers have been published, in which he gives a full account of these and other experiments on which he bases his theory of Anamorphism. He was always very careful to distinguish between this theory and that of "spontaneous generation" of earlier times. He claimed that the active protoplasm of the cell underwent some change, by which it passed over into these little bodies which he called bacteria.

The weak points in his and all the succeeding experiments made in this direction appear to be these: It is impossible to determine with certainty, first, that these bodies really are bacteria; second, if they are, what is their exact manner of origin. As long as these two points are not satisfactorily known, any theory based upon their presence, of course, can have no positive scientific value.

Index to Recent American Botanical Literature.

Abies Fraseri. C. S. S. (Garden and Forest, ii. 472, Fig. 132).

Aristolochia hians. J. D. H. (Bot. Mag. t. 7073).

Asa Gray—Scientific Papers of. Charles Sprague Sargent. (8vo, i and ii. pp. 900, Houghton, Mifflin & Co., 1889).

In these volumes Prof. Sargent has brought into compact and available shape a large part of Dr. Gray's reviews, essays and biographical notices. His larger works on systematic and structural botany are, of course, not included, nor are many of his more important and lengthy philosophical essays. The object has been to bring together his briefer papers, some of which were not reprinted when first published, and which are unknown to many modern readers who have not the opportunity to search through the various publications to which he was a constant contributor, from the year 1834 up to the time of his death in 1887. These volumes, although confessedly incomplete, bring into bold relief the vast scope of Dr. Gray's contributions to botanical knowledge. Vol. I is taken up entirely by his reviews of important works on botany and allied subjects, such as Lindley's Natural System of Botany, De Candolle's Prodromus, Agassiz's Zoölogical Nomenclator, De Candolle's Remarks on Botanical Nomenclature, Darwin's Insectivorous Plants, etc. Vol. II contains several of his important essays, on European Herbaria, Longevity of Trees, *Sequoia* and its History, Do Varieties Wear Out? A Pilgrimage to *Torreya*, Forest Geography and Archaeology, Pertinacity and Predominance of Weeds, Gender of Names of Varieties, etc., etc. Some of these will doubtless be read here by many for the first time, and any of them are profitable reading to the general botanist of to-day. Following these essays are his various biographical notices of celebrated botanists, including Short, Boott, Torrey, Bigelow, Englemann, Tuckerman and many others. The two volumes, besides being a handsome additon to any library, are of such interest, and render accessible so much of Prof. Gray's less known work, that our only regret is not having his complete works included in the same series. A. H.

Aster Herveyi. (Garden and Forest, ii. 472, Fig. 131).

Bacterial Disease of Corn—A. T. J. Burrill. (Bull. No. 6, Agric.

Exp. Sta., Univ. Ills., illustrated).

Bromeliaceæ—Handbook of the. J. G. Baker (8vo, 243, London, Geo Bell & Sons, 1889).

We have to thank Mr. Baker for a copy of this important work. It is uniform with his Fern-Allies and Amaryllideæ formerly reviewed in these columns, and we are glad to learn from the preface that a similar volume on the Irideæ is contemplated. Mr. Baker is recognized as the greatest living authority on all these petaliferous endogens, and it is to be sincerely hoped that he will complete the series so well begun. Thirty-one genera and more than eight hundred species are recognized in the present monograph. They are entirely confined to the warmer parts of America, by far the greater part of them being South American. Dr. Rusby's Bolivian collections are included, and furnish several new species of *Tillandsia*, *Puya* and *Bilbergia.* The Florida *Catopsis* collected by Garber is not the real *C. nutans* but *C. nitida*, the species (described as *Tillandsias*) having been reversed by Grisebach. The United States *Tillandsias* recognized are as follows: *T. usneoides*, L.; *T. recurvata*, L. (*T. Bartrami*, Ell.); *T. Wilsoni*, S. Wats.; *T. bulbosa*, Hook.; *T. setacea*, Sw. (*T. juncea* and *T. pinifolia*, Le Conte; *T. Balbisiana*, Schultes; *T. fasciculata*, Sw. (*T. bracteata*, Chapm.); *T. Valenzuelana*, A. Rich. (*T. Houzeavii*, Morren) and *T. utriculata*, L. To these we may add *T. flexuosa*, Sw., collected by Blodgett on Key West.

N. L. B.

Canadian Mosses. J. Macoun.

In this the fourth century of the distribution are included the remainder of the *Hypnums*, among which are the following desirable species: *H. dilatatum*, Wils.; *H. alpestre*, Sw.; *H. arcticum*, Wahl.; *H. sarmentosum*, Wahl.; *H. Richardsoni; H. hamulosum*, Br. and Sch.; *H. plicatile*, Lesq. and James; *H. Sendtneri*, Schimp.; the true *H. Cossoni*, Br. and Sch., not *H. vernicosum*, Lindb., of the Manual; *H. robustum*, and *H. œdipodium.* Five new species are issued with manuscript names by Lindberg: *H.* (*Harpidium*) *Renauldi*, n. sp., *H.* (*Isothecium*) *myurcellum*, *H.* (*Isothesium*) *Cardoti*, *Leskea nigrescens* and *Dichelyma longinerve.* Five new varieties are also included: *H. subimponens* var. *cristula*, *H. uncinatum* var. *substriatum*, *H. adnatum* var. *dentatum*; *Neckera Douglasii* var. *Macounii* and *Scouleria aquatica* var. *nigrescens*. A few miscellaneous species are added to make up the hundred, *Bryum Warneum*, *B. occidentale*, *B. inclinatum*, *Pogonatum capillare*, *Barbula flexifolia* and *Fissidens decipiens*. Prof. Macoun does not intend to issue another century, but, as good material accumulates, will distribute a dozen species for a dollar.

E. G. B.

Catalpa bignonioides. W. Goldring. (Garden, xxxvi. 239, illustrated).

Cocos Weddelliana. W. H. G. (Garden, xxxvi, 275-276, illustrated).

Dahlia lutea, *D. gracilis*, var. *superba*, *D. coccinea*. (Gard. Chron. vi. 274, 275, figs. 37, 38, 42).

The *Dahlia* conference, held last month in the Crystal Palace, London, recalled many facts in connection with this American genus, and its propagation abroad as an ornamental plant. The "*Dahlia* Centenary," as it is called by our friends across the water, is recognized as an important date, and everything relating to the genus is being hunted up. It was first introduced into England in 1789 by Lord Bute. The figures are said to "represent some of the nearest approaches to the original wild forms."

Eriogonum—A New Species of—from Lower California. C. C. Parry. (West Am. Sci., vi. 102, 103). A description is given of a new species, *E. fastigiatum*, collected by C. R. Orcutt, No. 1501, La Salada, L. Cal. April, 1886).

Excursion Botanique a 165 Lieues du Pole Nord. Ed. Jardin. (Bull. Soc. Bot. de France, xxxvi, 194-203).

An account of the botanical part of the work accomplished by the Greeley expedition.

Ferns—The Home of the. T. J. Evans. (Pop. Sci. Monthly, xxxv. 814-819).

A popular account of the fern flora in the neighborhood of Killarney.

Fungi—List of—collected in 1884 along the Northern Pacific Railroad. A. B. Seymour. (Proc. Bost. Soc. Nat. Hist. xxiv. 182-191).

An enumeration of a large number of species, with place of collection and host plants. *Uromyces argophyllæ* and *U. Alopecuri* are described as new.

Fungi Novi Brasilienses. P. A. Karsten. (Rev. Mycol. xi., 206, 207).

Seven new species and two new genera (*Eurotiopsis* and *Microspatha*) are described.

Gymnosporangium—The Uredo-stage of. H. M. Richards. (Bot. Gaz. xiv. 211-216, Pl. XVII.; also reprinted).

Hickory—The Shell-bark. (Garden and Forest, ii. 460, 461, fig. 130).

Hot Springs—The Vegetation of. Walter H. Weed. (Am. Nat. xxiii. 394–400.)

The author calls attention to the probability that the vegetation which exists at the present time in or near hot and highly mineralized water, may fairly represent such as lived in early geological times. The temperature limit to life-supporting waters appears to vary in different localities. The highest is said to be 200° Far., noted by Prof. Brewer at Pluton Creek, Cal. At Ischia and in the Yellowstone National Park the limit is about 185°. Algæ are alone represented at such temperatures. Diatoms do not appear to be very abundant and several species found in hot springs in the Azores are identical with forms found in cooler waters in Great Britain. One of the most widely distributed of the hot water algæ is *Hypheothrix laminosa.* This species varies in color according to the temperature, as the following observations made by the author in the Yellowstone region will show: at 90° brown; 110, red; 125°, orange; 130°, dark green; 140°, emerald; 155°, yellow green; 164°, pale yellow; 181°, pale pink; 185°, white. The most perfect development was found at a temperature of about 140°.

Lake Erie Shore as a Botanizing Ground—The. T. J. W. Burgess. (Journ. and Proc. Hamilton Assn., February 15, 1889; reprinted).

In this excellent paper the author calls attention to the large number of species reported from the region by former botanists and explorers, which have not since been seen or noted. A list of twenty-two such species is given, with their reported localities, for the guidance of the modern botanist. A list of plants believed to be restricted to the region, and one of such as are almost restricted to the same district, are appended. The work is one of great value to the collector in that locality, and is a welcome addition to our list of local plant catalogues.

Matico, (*Piper angustifolium*). H. H. Rusby. (Drug. Bull., Sept. 1889, illustrated, reprinted).

North American Trees—Notes upon some. C. S. Sargent. (Garden and Forest, ii., Nos. 73-86, July 17—Oct. 16, 1889).

Professor Sargent has given us in these papers an exceedingly valuable contribution to American botany as well as to forestry. They consist of a series of notes on species, arranged in their botanical sequence, numbered according to the Census Catalogue, with critical remarks on nomenclature, distribution and rank as species or varieties, and the insertion of those added to our arboreal flora since the publication of that work. It is deemed important that a record of the most noteworthy facts brought out by Professor Sargent should be preserved in the BULLETIN, and as an avowed purpose of his work is to call out criticism, I venture to review it at considerable length.

Magnolia tripetala, L. is the name taken up for *M. Umbrella,* Lam., and very properly, but no allusion is made to the fact that it was adopted in the "Preliminary Catalogue of Plants" issued by the Club considerably more than a year ago. *Tilia pubescens,* Ait., is retained as a species, in which decision Prof. Sargent differs from the conclusions last reached by Dr. Gray. Doubt is expressed as to the correct reference of *Xanthoxylum Floridanum,* Nutt. to the West Indian *X. Caribæum,* Lam., and the question left open for future investigation. *Xanthoxylum emarginatum,* Sw., is an addition to the North American flora, having been collected on Virginia Key by Dr. Garber in 1877, and preserved in Professor Porter's herbarium. *Helietta parviflora,* Benth., and *Kœberlinia spinosa,* Zucc., both Texan, are found to attain sufficient dimensions to be included as trees, and the same is true of *Ilex monticola.* A curious mistake is made under *Cliftonia;* Professor Sargent is working, it will be remembered, on the principle of maintaining the oldest specific names, and referring to a note by Dr. Watson (BULLETIN, xiv. 167), remarks that it was there shown that the oldest name is *Cliftonia nitida*, Gærtn. fil. (1805), but if he had read a line further he could hardly have failed to note what Dr. Watson actually did show, that it is *Ptelea monophylla*, Lam. (1791)! *Rhamnus crocea*, Nutt., finds a place among the trees, and *R. insularis*, Greene, is reduced to a variety of it. *R. arboreus*, Greene, is reduced to a variety of *R. velutinus*, Dougl.; all are acknowledged as arboreous. *Æsculus octandra*, Marsh. (1785), replaces *Æ. flava*, Ait. (1789). It is made clear that the sugar maple is to be called *A. saccharum*, Marsh. while the silver maple becomes *A. saccharinum*, L. Prof. Sargent fears that this will make "hopeless confusion," but we think differently, as they are clearly two different words. *Negundo Californicum* is reduced to a variety of *N. aceroides*. *Rhus integrifolia*, Brewer & Wats., of Southern California, is admitted as a tree. *Cladrastis tinctoria*, Raf., becomes *C. lutea* (Michx. f.) Koch, having been described by the younger Michaux as *Virgilia lutea*. *Cercidium* is kept up as a genus, and *Parkinsonia Torreyana*, Wats. transferred to it; *C. floridum*, Benth., becomes a tree in the valley of the lower Rio Grande. *Acacia Farnesiana*, Willd., and *A. flexicaulis*, Benth., are both admitted, as is *Pithecolobium brevifolium*, Benth. *Vauquelinia Torreyi*, Wats., becomes *V. Californica* (Torr.), Sargent. *Cratægus rivularis*, Nutt., is reduced to a variety of *C. Douglasii*. *Cratægus viridis*, L., replaces *C. arborescens*, Ell. and *C. coccinea* is given three varieties; *C. punctata* is maintained as a species; *C. cordata*, Ait., (1789) must be retained for *C. populifolia*, (1788), for Walt., the species was first published by Miller as *Mespilus cordata* (1760); *C. berberidifolia*, T. and G., is reduced to a variety of *C. Crus-Galli*, and *C. flava*, Ait., becomes *C. flexispina* (Mœnch). Sargent. This critical work on an extremely difficult genus is especially welcome. *Terminalia Buceras* has been detected by Mr. Curtiss on Elliott's Key, Fla. *Aralia spinosa* has been found in tree-like dimensions by Professor Sargent in the Big Smoky Mts. *Nyssa Ogeche*, Marsh. (1785), replaces *N. capitata*, Walt. (1788). Doubt is expressed concerning the correct reference by Prof. Gray of the Arizona *Arbutus* to *A. Xalapensis*, H.B.K. *Fraxinus cuspidata*, Torr., is admitted. *Nectandra Willdenoviana* Nees, is referred to *N. Catesbyana* (*Laurus Catesbyana*, Michx.), but Mez has found an earlier specific name in *L. coriacea*, Sw., the tree becoming *N. coriacea* (Sw.), Griseb. *Sebastiana lucida*, Muell., becomes *Gymnanthes lucida*, Sw., as it was first described. *Ficus brevifolia*, Nutt. and *F. peduncularis*, Nutt., are referred to *F. populnea*, Willd. *Morus microphylla*, Buckley, becomes *M. celtidifolia*, H.B.K. *Carya*, Nutt., is referred back to *Hicorius*, Raf., and specific names taken up as indicated in the BULLETIN, xv. 275 et seq., except *H. microcarpa*, which Prof. Sargent agrees with me in considering a doubtful species. I have elsewhere shown that the older spelling was *Hicoria*. The post oak becomes *Quercus minor* (Marsh.), Sargent (Q. alba minor, Marsh.), and *Q. parviflora*, Chapm. is referred to it as a variety. *Q. Gambellii*, Nutt., is restored to specific rank. *Q. virens*, Ait. (1789) is superseded by *Q. Virginiana*, Mill. (1768), and *Q. falcata*, Michx. (1803) by *Q. cuneata*, Wang. (1789). The chestnut becomes *Castanea sativa* var. *Americana*. *Betula populifolia* is held up as a species. *Cupressus thyoides* becomes *Chamæcyparis thyoides*, as already printed in the New York Catalogue, a fact which Prof. Sargent fails to note. *Juniperus flaccida*, Schlecht., found by Dr. Havard in Western Texas, is added to the list of trees. *Pinus inops*, Ait. (1789,) is antedated by *P. Virginiana*, Mill. (1768); *Pinus latifolia*, Sargent, is a new species from the Santa Rita Mountains of Arizona, *Picea nigra* becomes *P. Mariana*, and *P. alba* ought to become *P. Canadensis* as pointed out in the New York Catalogue. *P. Breweriana*, Wats., is an addition to former lists. *Abies bracteata* is replaced by *A. venusta*, and *Larix laricina* is the name adopted for the Tamarack.

Thirteen species which were given in the Census Report are dropped from the present list. Six others are reduced to varieties, and two to synonomy, making a reduction in the number of twenty-one, as against an increase of thirty, a gain of seven, the total number of arboreus N. A. species now recognized by Prof. Sargent being 419.

N. L. B.

Paraguay and its Flora. I. Thos. Morong. (Bot. Gaz. xiv. 222-227).

Phoradendron flavescens. H. H. Rusby. (Drug. Bull., Aug. 1889, illustrated; reprinted).

Picea alba. (Forest Leaves, ii.; illustration).

Podostemaceæ III. Eug. Warming, (Kong. Danske Videnskabernes Selskabs Skrifter, (VI.) iv. 445-514; twelve plates.

The third of these elaborate papers, describing results of investigations into the morphology of this obscure order of plants, has recently come to hand. The diagnoses and minute descriptions are in Danish and Latin, and there is a resumé and explanation of the plates—on which all the species mentioned are illustrated—in French. *Podostemon Mülleri*, *P. Schenckii*, *P. Galvonis*, *Mniopsis Saldanhana*, *M. Glazioviana* and *Ligea Glaziovii*, are all new species from Brazil, and there are described as well *P. distichus* (Cham.), Warm.; *P. subulatus*, Gardn., *Apinagia Gardneriana*, Tul., *A. Riedelii* (Bong.), Warm., *Lophogyne aculifera*, Tul. and Wedd. and *Mourera aspera* (Bong.), Tul. There is a discussion of the place of the order in the system and the position formerly advanced, that it is to be joined with the Saxifrageæ, is maintained, differing in this from M. Baillon, who refers it to the Caryophylleæ. N. L. B.

Polypodium—A new species from Jamaica. J. G. Baker. (Journ. Bot. xxvii. 270).

Description of *P. Fawcettii*, from the higher mountains of the island.

Potamogeton Zizii—The Synonomy of. Arthur Bennett. (Journ. Bot. xxvii. 263-265).

Potentilla—Ueber Eine Neue aus Mittelamerika. Karl Fritsch. (Engler's Bot. Jahrb. ii. 314-317).

A new species, *P. heterosepala*, with two varieties, *Guatemalensis* and *Mexicana*, are described.

Senega-Wurzel—Ueber Falsche. J. M. Maisch. (Pharm. Rundsch. vii. 236-238).

Our pharmaceutical friends appear to be in trouble over the substitution of some other species of *Polygala* for the *P. Senega* of commerce.

Temperature of Trees—Observations on the. H. L. Russell. (Bot. Gaz. xiv. 216-222, Pl. xviii).

In this article the author gives an account of the results obtained by boring holes into several deciduous and evergreen trees and noting the temperature of the interiors. Comparisons were made between different species, between individuals of the same species with and without foliage, etc., also between the relative temperature of the interior of the trees and that of the exterior atmosphere. It was evidently a work involving considerable labor and accurate observation.

Trinidad—Annual Report on the Royal Botanic Gardens for 1888. J. H. Hart. (Pamph. 4to. pp. 41, illustrated; Port of Spain, 1889).

Proceedings of the Club.

The regular monthly meeting was held on Tuesday evening. Oct. 12th, the President in the chair and twenty-one persons present.

Dr. Chas. Lehlbach, Dr. J. H. Oyster, Mr. James N. Baxter and Mrs. Henry Hastings were elected Active Members.

The resignation of Miss Stabler as Curator was presented and accepted, and Miss Rogers was elected to fill the vacancy.

A paper on the Hepaticæ collected by Dr. H. H. Rusby in the Andes of Bolivia, 1885–1886, by Dr. Richard Spruce, accepted for publication in the MEMOIRS, was read by title.

Dr. Britton read the announced paper of the evening on " The Flora of New Jersey."

The adjourned meeting was held on Wednesday evening, Oct. 23d, the President in the chair and twenty-four persons present.

Miss Grace H. Learned, Mr. George J. Pierce of Cambridge, Mass., and Hon. Jos. R. Churchill of Dorchester, Mass., were elected Corresponding Members.

Dr. Emily L. Gregory read the announced paper of the evening " On some Botanical Reading done in the Laboratory of Professor Schwendener, in Berlin, during June and July, 1889," which will be found at another place in this number of the BULLETIN. Professor Schrenk remarked that both the subjects discussed by Miss Gregory had been before the Club several years ago, before they had been so much investigated by the European observers.

Dr. T. F. Allen remarked on his discovery in July, 1872, of a new species of *Eriogonum* allied to *E. tomentosum*, Michx., near White Sulphur Springs, West Virginia. This has been named *E. Alleni* by Dr. Sereno Watson, and the description will appear in the addenda to the new edition of Gray's Manual. He wished to emphasize the fact that the plant had been found at the place mentioned, as this had been called in question.

Professor Schrenk exhibited microscopical preparations of cross sections of the leaves of the Witch Hazel, *Hamamelis Virginica*, showing peculiar structures called "osteo-sclereid cells," found at the extremities of the fibro-vascular bundles, and situated vertically to the leaf-surfaces, often reaching to the epidermis. He concluded that they are functionally strengthening elements. They are very abundant in the leaves growing in the shade and wanting in those of firmer texture exposed to the sun light.

Dr. W. E. Wheelock exhibited a specimen of *Crepis virens*, found at Greenwich, Conn., and not reported from that State in Mr. Bishop's Catalogue.

Dr. Britton showed a specimen of *Deutzia Mexicana*, Hemsley, collected by F. Müller in Orizava, Mexico, and remarked on its interesting isolation, all the other known species being of Asiatic distribution. Mr. Hemsley's description states that the fruit is unknown; this specimen has fruit, which does not differ materially from that of the Asiatic species.

Dr. Allen remarked on the extremely meagre flora of Block Island, which he had recently visited in search for Characeæ. The same two species occur there as on the eastern end of Long Island, however, but the *Œnothera fruticosa*, var. *humifusa* of Montauk Point was not observed, but, instead, a very abundant growth of a depressed form of *Solidago nemoralis*.

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On the Floating-tissue of Nesæa verticillata (L.), H.B.K.

By Joseph Schrenk.

Plates XCV–XCVII.

Nesæa verticillata grows in stout clumps along the swampy borders of our ponds and lakes. In the months of July and August many of the slender, wand-like stems sent up by the root-stock have attained a considerable length (frequently six or eight feet), and begin to bend downward by their weight, until the apex of the stem touches the surface of the water, when it curves upward again (Plate XCV). Very soon we notice a swelling around the stem at the region of contact between stem and water, about 10 mm. below the apex. The apex continues to grow more or less rapidly, while the swelling below it increases and extends over a distance of from 20 to 40 cm. (Fig. 1). Simple roots now make their appearance on the lower side of the internodes lying on the water, which keep growing straight downward, sometimes to a remarkable length, until, at last, they reach the bottom and penetrate into the ground, that portion of the stem over which the swelling has extended remaining floating on the water.

Meanwhile the epidermis of the stem, at this region, shows longitudinal fissures, and a snowy white, soft, elastic, spongy tissue is seen underneath. At a more advanced stage the roots, having taken a firm hold of the muddy ground, draw the internodes at which the swelling first appeared down into the water, and the swelling gradually extends over those parts of the stem, both towards the parent rootstock and the apex, which are compelled to follow the rooting internodes down into the water. The formation of the spongy layer surrounding the immersed parts of the plant continues, until in many stems its thickness amounts to 15 mm. and sometimes even more. The greatest thickness is always found at the place at which the swelling started, i.e., in older plants nearest the bottom. Upwards its thickness diminishes until it disappears entirely at the surface of the water. The fissures in the outer bark have, by this time become more numerous, and it adheres to the underlying white tissue only loosely in long shreds, or is thrown off altogether.

The white spongy mass itself can be easily separated from the woody part of the stem. On a cross-section numerous concentric layers can be distinctly noticed even with the naked eye; however they are not separable from one another tangentially, while it is quite easy to tease apart the tissue in thin strips both in a transversely and longitudinally radial direction. On older stems, or when dry, it assumes a light yellowish brown color, retaining its spongy appearance and elasticity.

Under the microscope we find that this tissue consists of parenchymatic cells of peculiar shape and arrangement. Each of the concentric layers we distinguished with the naked eye or with the aid of a magnifying glass, represents a floor built of cells of equal height but irregular outline, with numerous intercellular spaces between them (Figs. 5 and 7). From many of these cells, placed at irregular intervals, arise slender columns of equal height supporting a ceiling which is of the same structure as the floor and which serves as a floor for another tier of columns carrying another ceiling, etc. The further these tiers or stories are removed from the woody part of the stem the larger are the intercellular spaces in the floors, until their cells, having all become quite elongated, form a sort of lattice-work, laterally bracing up the vertical rows of columns (Fig. 7). The shafts of the columns are simply outgrowths of the basal cells on which they stand, so that a longitudinal radial section of such a cell has the appearance of an inverted T with a very long stem. The average length of the columns is 320 μ and their width 32 μ.

The walls of these cells are very thin and consist of cellulose; they contain a delicate lining of protoplasm, in which slow, but distinct currents may be noticed, and also small rounded starch-grains. The numerous intercellular spaces are filled with air, which makes the tissue appear white. It clings very tenaciously to the outside of the cell-walls, which form a complicated system of capillary tubes, but is easily driven out when thin sections are immersed in alcohol for a short time.

The manner, time and place of origin of this tissue, and the presence of a great amount of air in it, seem to leave no doubt that its function is to keep the apex of the stem from sinking below the surface of the water, and to keep the stem afloat so that it can continue its growth in the air and sunshine, while at the same time, by sending roots through the water down into the soil, it can establish itself as an independent individual for the next season. In the fall, after the seeds have become ripe, the long, slender stems die, except those portions that have produced the floating tissue around them and have rooted in the mud. The dead stems being very brittle, easily break off and soon disappear.

The new root-stock thus established, sometimes at considerable distance from the mother plant, has developed a woody zone several times as thick as that of the slender stem of which it was a part. All the wood-cells, both of parenchymatic and prosenchymatic form, are densely packed with reserve starch; the grains are of a very characteristic elongated ellipsoidal form, from 8 to 16 μ long and 1 to 2 μ wide. Calcium oxalate is found in the pith and bark in almost all its forms; there are raphides, rhombic prisms, and globular conglomerations of crystals. The presence of a tannin is demonstrated by the black stains invariably appearing on the razor used to make sections.

The development of the floating tissue is as interesting as its function. When we examine the top of a stem soon after it has touched the water, we find that, about one or two millimeters from the apex, a large-celled central pith is surrounded by a circle of fibro-vascular bundles each containing a few annular and spiral ducts and, on the peripheral side, some tender cribrose tubes with horizontal sieve-plates; no bast elements can be detected as yet. The primary bark consists of rounded cells which, even at this early stage, have rather large intercellular spaces between them. It is enclosed by an epidermal layer of oblong cells, and a subepidermal ring resembling collenchyma. A little farther downward, about 8 mm. from the apex, the most important change to be noticed is the development of cribrose tissue on the centripetal side of the fibro-vascular bundles. (Later on some much elongated sclerenchymatic cells surround the bicollateral bundles on their inner side). In the secondary bark bundles of young bast-fibres are detected. In the primary bark large air-spaces, much elongated in the direction of the axis, have been formed by the separation of the parenchyma cells.

The development of the different tissues continues in the manner indicated, and on cross-sections about 8 cm. from the apex, where the swelling of the stem is just about noticeable, we find the primary bark traversed longitudinally by numerous air-channels resembling those of so many aquatic plants (ch. figs. 2, 3, 4, 6, 7). Sometimes the cells of this lacunar bark elongate so much, especially in a radial direction, and their connection becomes so loose, that it resembles, to some extent, the floating-tissue described above.

At the inner border of the primary bark is a ring of isolated groups of typical bast-fibres surrounding the phloëm, (bf. Figs. 2, 3, 4.) and in the narrow zone of parenchyma between the bast-fibre bundles and the groups of sieve-tubes we meet with a new tissue-element. Many of these parenchyma cells have been divided by a tangential partition (m. Fig. 2) at first an irregular interrupted ring of meristem is formed, then the gaps are gradually filled up, and a closed ring is developed between the cribrose zone and the groups of bast-bundles, very much resembling the secondary phellogenetic layer of many barks, (m. Figs. 3, 4, 5). This meristem at first produces, in a centrifugal order, a few rows of oblong, flat cells. In the outer rows the cells soon become rounded off at the longitudinal edges so that most of them cohere only slightly along the middle of their tangential surfaces. Now, here and there, a cell in the outermost row begins to bulge out in the middle of its outer tangential wall, thus producing a short pillar that presses against the cells situated still farther toward the periphery (l. Figs. 3, 4). The same change takes place in the layer underneath, toward the initial meristem. Each cell directly under the one that produced the pillar-like process sends out a similar excrescence (fl. Fig. 3), and by the united pressure of all the rising columns the cells of the outermost row are separated from the layer underneath, are raised in a body, and now form a kind of ceiling supported by the numerous rapidly elongating columns inserted in the floor consisting of the cells of the next inner layer (Figs. 3, 4, 5, 7). This process is repeated with the third and all the successive layers pushed outward by the activity of the meristem, so that in a short time this tissue assumes the characteristic appearance described above. The loosening and raising of the various layers does not take place all around the stem at the same time, but only over a limited area in the centre of which the columns become tallest, so that an arched ceiling is formed. Then another contiguous arch arises leaning against some portion of the former, etc., consequently the arrangement of the layers is not strictly concentric.

The cells outside of this newly formed tissue are, of course, at once affected by the increasing outward pressure. The bast-bundles with the lacunar primary bark are raised (Figs. 3, 4) and forcibly torn away from their connection with the phloëm part of the stem. The loosely cohering parenchyma cells of the outer bark cannot resist the radial pressure, it is burst open longitudinally in different places, and either adheres in narrow strips to the floating tissue, or is thrown off. The bast-fibres are either pushed outward, retaining their connection as entire bundles, or, by the unequal pressure of the elongating columnar cells they are separated from one another and are found scattered about among the outer layers of the floating tissue, or else are thrown off with the primary bark.

The floating tissue usually accommodates itself to the increase of the circumference by the tangential elongation of the cells forming the successive "floors." Frequently, however, it is rent by longitudinal clefts similar to those appearing in the old bark of trees. The structure of this tissue is often quite intricate, for besides the "floor-beams" placed in various directions within the same horizontal plane, parallel to the surface, there are numerous strands of elongated cells running obliquely across several tiers (Fig. 7) connecting and bracing them like the lattice work of large iron girders, all of which accounts for its remarkable elasticity and strength.

These microscopic examinations were commenced in the month of April, when Mr. J. W. Martens of this Club was kind enough to collect some material for me at Lake Mohegan. During the summer I had occasion to observe the habit of the plant, especially at Duck Harbor Pond (Wayne Co., Pa.), and in August the microscopic work was finished and the conclusions in regard to the function of the tissue described were reached. Since that time, through the courtesy of Dr. Schenck, of Bonn, I have received his "Habilitationsschrift" "On the Aërenchyma," *etc. In this elaborate paper 34 species of plants mostly tropical, growing in swamps, are described and discussed, all of which produce a tissue, called by Schenck "aërenchyma," identical with, or similar to that of our *Nesæa*, which is also mentioned in an appendix as possessing aërenchyma of the same structure and origin as *Jussiæa*, but is not individually described. In the introduction to the article the literature of this tissue is mentioned,† and it appears that as early as 1866 Martins described the "racines aérifères" of some species of *Jussiæa*, while in 1888 Scott and Wager gave a full account of the histology and development of this tissue in the floating roots of *Sesbania aculeata*,.

As to the function of the tissue Schenck comes to the conclusion that, as the aërenchyma is produced in plants belonging to widely separated families, but all living under similar conditions, it must assume, in all the cases mentioned, the same physiological task; furthermore, that the aërenchyma is a tissue which facilitates the respiration of plant-organs growing in the water or mud, by furnishing them with oxygen which is transmitted from the outside medium through the aërenchyma cells to the interior tissues. After discussing the opinions of some authors that the tissue in question might serve as a floating apparatus, Schenck repeats his assertion that a tissue which is always so uniformly constructed must also always perform the same principal function; he admits, however, that the buoyancy of the floating organs may be increased by this tissue, but does not depend upon it.

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* Pringsheim's Jahrb. xx. pp. 526-574.

† *Charles Martins*,...sur les racines aérifères, etc. Mém. Acad. Sc. Montpellier, 1866.—S. Rosanoff, ... Schwimm organe von *Desmanthus natans*, Bot. Ztg. 1871, p. 829.—N. Lewakoffsky, Ueber den Einfl. d. Wassers, etc. Ref. Just, 1873, p. 594.—K. Perseke, Dissertation, Leipzig 1877.—Scott and Wager, On the floating roots of *Sesbania aculeata*. Annals. Bot. i. 1888.

I am not prepared to enter into a discussion of the general function of the "aërenchyma"—which term is, at all events, a very significant one—but must add the result of some observations, referring to *Nesæa* only, made with particular regard to the general statements in the above mentioned paper. It seems to me that, above all, it is very important to answer the question: Under what conditions, when and where does this tissue make its *first* appearance? In *Nesæa*, as we have seen, it is first detected at the point of contact of the apex of the stem with the surface of the water. There it increases quite rapidly, while the portion of the stem resting on the water often produces leaves and branches. The latter are frequently surrounded with floating tissue up to one or two inches above the surface of the water (Fig. 1). We are not justified in assuming that at this early stage, when the whole stem is still exposed to the atmosphere, the necessity of obtaining more oxygen causes the plant to produce the aërenchyma, while it seems quite natural to suppose that it is advantageous to the plant to be enabled to keep the ends of its stems afloat, and let them continue their vegetative and reproductive work until they have rooted and established themselves as independent plants.

The view that the aërenchyma of *Nesæa* is chiefly a "floating" tissue, is perhaps supported, to some extent, by the observation that the meristem producing it is first noticed at the sides and at the upper part of the horizontal floating stem, and that, consequently at a later stage, the aërenchyma is more copiously developed at those places than on the lower side, where the roots grow. The first longitudinal crevices invariably appear at some distance from the adventitious rootlets, parallel with the line along which they grow, and higher up on both sides, enclosing a broad zone of primary bark along the upper side of the stem. It is easily seen that this position of the aërenchyma will give the stem the greatest possible buoyancy.

When the horizontal stem has become submerged and has rooted in the mud, a new characteristic change occurs in its aërenchyma. At a certain time a layer of cells produced by the phellogen-like meristem will not, like the preceding ones, develop any columnar extensions, but the walls of the closely packed cells become suberized, and then the whole layer, together with several layers of rounded, also rather closely arranged cells under it, is raised by a new growth of columnar cells of about six tiers, and, finally, another layer, in the same position as the one first mentioned, becomes suberized. Herewith, in the month of October, the growth seems to cease. Further investigation is necessary to learn whether or not, and how, the rootstock will continue to produce aërenchyma the next year. In old rootstocks examined the two layers of corky cells just described were the only ones that could be seen within the aërenchyma. But on older stems, from which the primary bark has partly been thrown off, the exposed surface of the aërenchyma is covered with a smooth, dark, blackish-brown pellicle which, when removed with the forceps or the razor, proves to be a layer of corky cells. When thin longitudinal or transverse sections are placed in chromic acid, the various lignified and cellulose tissues will gradually disappear and these corky layers alone are left. The thin membrane will turn over on its flat side, as is usual in such cases, and we can then see that the cork cells are quite closely packed, leaving no intercellular spaces at all. This complete separation of the bulk of the aërenchyma from the interior of the stem, and also from the surrounding water, would hardly take place if the plant were dependent upon the aërenchyma for its supply of oxygen.

In the month of August I found, proceeding from a rootstock, some creeping, runner-like rooting branches, about 8 mm. in diameter. The primary bark was nearly 2 mm. thick and of a spongy structure caused by numerous wide air channels (ch. figs. 5, 6). It was separated from the narrow phloem zone, which was not strengthened by any bast-fibres, by an endodermis. Under this endodermis, but extending only over a small portion of the circumference, a meristematic zone of cells was detected resembling those in the floating stem (m. Figs. 5, 6). Whether, later in the season, it produced aërenchyma or not, I was unable to ascertain. If so, this aërenchyma could not, of course, be considered as "floating" tissue.

Its occurrence in this position, as well as on the submerged bases of the upright stems and on the upper part of the larger roots, seems to speak against the assumption that it serves as a floating tissue, for it seems singular and a great waste that it should be produced under circumstances which preclude its acting as a float. But if we consider that the tissue zones of newly formed lateral organs are continuous with those of the parent stem, we have good reason to assume that the phellogen-like meristem of the floating stem extends into the branches and roots. Nor is it improbable that, like other meristems, it may retain its activity for a considerable time, and give rise to additional aërenchyma, although its original services are no longer required.

However, I will not venture to assert that, even in *Nesæa*, the spongy tissue does not contribute at all to the aëration of the submerged parts, as, according to Schenck, really seems to be the case with many other plants; but I might say, in conclusion, that in reference to *Nesæa* its principal and most valuable function seems to be the assistance it renders the plant to keep its stems afloat, thereby materially facilitating its vegetative propagation.

November, 1889.

EXPLANATION OF THE PLATES.

Fig. 1.—*Nesæa verticillata* in the beginning of August; *bt*, bottom of pond; *sf*, surface of water.

Fig. 2.—Portion of cross-section 8 cm. from apex of floating stem; *c*, cambium; *st*, sieve-tissue; *m*, phellogen-like meristem; *bf*, bast-fibres; *ch*, air-channels, × 280.

Fig. 3.—Portion of cross-section of young floating stem. *fl*, floating tissue; other letters as above, × 125.

Fig. 4.—Portion of longitudinal section of stem, somewhat nearer apex than Fig. 3. Letters as above, × 125.

Fig. 5.—Portion of longitudinal radial section of floating stem, showing the four youngest tiers of the floating tissue, × 125.

Figs. 6 and 7.—Transverse and radial longitudinal sections of rhizoma, cf. text, p. 318; *en*, endodermis, × 125.

Fig. 8.—Portion of floating tissue in old stem; × 94.

An Enumeration of the Plants Collected by Dr. H. H. Rusby in South America, 1885-1886.—IX.

(Continued from p. 262.)

GALACTIA MONTANA, spec. nova. Procumbens vel adscendens; ramulis elongatis, molliter pubescentibus; foliolis 3, oblongis, obtusis, emarginatis, subter pilosis, supra glabratis vel minute tuberculatis; racemis axillaribus, folio brevioribus, paucifloris; flores 13 mm. lat.; calycis laciniis tubo æquantibus; leguminibus sericeis, 2–3 cm. longis. Sorata, 8,000 ft. (972). The same as Mandon's No. 742.

Cratylia floribunda, Benth. Ann. Mus. Vind. ii. 132. Beni River. (1330).

Canavalia ensiformis (L.), DC. Prodr. ii., 404. Mapiri, 5,000 ft. (1328 and 2858); Guanai, 2,000 ft. (2369).

Dioclea lasiocarpa, Mart. in Benth. l. c. 133. Guanai, 2,000 ft. (1327); Mapiri, 5,000 ft. (2357).

Dioclea, a species resembling the last but with flowers twice as large and leaves nearly smooth. Yungas. (1325).

Dioclea reflexa, Hook. f. Niger Flora, 306. Unduavi, 8,000 ft. (2397).

Phaseolus ovatus, Benth. l. c. 139. Junction of the Rivers Beni and Madre de Dios. (1337).

Phaseolus campestris, Mart. in Benth. l. c. 141. Guanai, 2,000 ft. (2367). Referred to this species with some doubt.

Phaseolus erythroloma, Mart. in Benth. l. c. Unduavi, 8,000 ft. (2368).

Phaseolus peduncularis, HBK. Nov. Gen. vi. 447. Junction of the Rivers Beni and Madre de Dios. (1339).

PACHYRHIZUS BULBOSUS (L). (*Dolichos bulbosus,* L. Spec. Pl. 1021; *P. angulatus,* Rich). Beni River. (1326). An entire leaved form referred to this species with some hesitation.

Cajanus Indicus, Spreng. Syst. Veg. iii. 248. Mapiri, 5,000 ft. (2360).

DALBERGIA FRUTESCENS (Vell.) (*Pterocarpus frutescens,* Vell. Fl. Flum. vii. t. 96; *D. variabilis,* Vogel). Guanai, 2,000 ft. (2532).

Machærium angustifolium, Vogel, Linnæa, xi. 193. Guanai, 2,000 ft. (1324); Yungas, 4,000 ft. (2366).

Machærium sordidum, Benth. in Mart. Fl. Bras. xv. Part 1. 241?

Guanai, 2,000 ft. (2361). Compared with Claussen, 139 in Herb. Kew, and apparently the same.

Machærium acuminatum, HBK. l. c. 391. Guanai, 2,000 ft. (1321 and 1322).

Machærium, species undetermined. Falls of the Madeira. (1323).

Pterocarpus Rohrii, Vahl. Symb. ii. 79. Falls of the Madeira. (2401).

Pterocarpus violaceus, Vogel. Linnæa, xi. 416. Junction of the Beni and Madre de Dios. (2359).

Lonchocarpus macrocarpus, Benth. Journ. Linn. Soc. iv. Suppl. 91. Guanai, 2,000 ft. (1329).

Lonchocarpus, species undetermined. Junction of the Beni and Madre de Dios. (2362).

Derris Negrensis, Benth. in Mart. Fl. Bras. l. c. 289. Reis, 1,500 ft. (2374). A form or variety with panicled inflorescence.

Andira inermis (Sw.), HBK. Nov. Gen. vi. 385. Falls of the Madeira, Brazil. (2353).

Sophora macrocarpa, Smith in Rees Cycl. 6. Unduavi, 8,000 ft. (2364).

TOUNATEA ARBORESCENS (Aubl). (*Possira arborescens*, Aubl. Pl. Gui. ii. 934 (1775); *Rittera triphylla*, Sw. Prodr. 82, (1788); *Swartzia triphylla*, Willd.) Junction of the Rivers Beni and Madre de Dios (1320).

TOUNATEA FUGAX (Spruce). (*Swartzia fugax*, Spruce, in Mart. Fl. Bras. xv. Pars II. 30). Guanai, 2,000 ft. (1319).

Cæsalpinia pectinata, Cav. in DC. Cat. Hort. Monspel. 84. Tacna, Chili (2358).

Cassia bacillaris, L. f. Suppl. 231. Reis, 1,500 ft. (2400).

Cassia affinis, Benth. in Mart. Fl. Bras. xv. (II.), 98. Yungas, 6,000 ft. (837). Specimens referred to this species with some hesitation.

Cassia bicapsularis, L. Spec. Pl. 538. Mapiri, 2,500 ft. (988).

Cassia occidentalis, L. l. c. 539. Reis, 1,500 ft. (983).

Cassia trachypus, Mart. Fl. Bras. xv. (II.) 122. Mapiri, 2,500 ft. (986).

Cassia atomaria, L. l. c. 540. Near La Paz, 10,000 ft. (1042).

Cassia leiophylla, Vog. var. (?) *pubescens*, Benth. in Herb. Kew. Guanai, 2,000 ft. (987).

Cassia emarginata, Clos in C. Gay, Fl. Chil. ii. 235. Near Valparaiso, Chili (979).

Cassia tomentosa, L. f. l. c. Near La Paz, 10,000 ft. (981). Yungas, 6,000 ft. (989).

Cassia latiopetiolata, Domb. in Vogel Syn. Cass. 70. Tacna, Chili (982); Near La Paz, 10,000 ft. (980).

Cassia pilifera, Vogel, l. c. 23. Mapiri, 5,000 ft. (984).

Cassia Chamæcrista, L. l. c. 542. Guanai, 2,000 ft. (2854).

Cassia flavicoma, HBK. Nov. Gen. vi. 366. (1021).

Bauhinia longifolia (Bong.), Steud. Nom. and in Benth. in Mart. l. c. 192. Falls of the Madeira, Brazil, (951).

Bauhinia inermis (Cav.), Pers. Ench. i. 455. Reis, 1,500 ft. (950).

BAUHINIA RUSBYI, spec. nova. Sectio Pauletia. Foliis majusculis, ad ¾ bilobis; lobis lanceolatis, coriaceis, obtusis, divergentibus, 5-7 nervis, subtus dense pubescentibus, venis prominentibus, supra glabris, nitidis; ramuli tereti, pubescenti, aculeati; petala anguste linearia, 1 cm. longi; racemi elongati; petioli 2 cm. longi; calycis tubus 1 cm. longus; legumen 10-12 cm. longum, 1 cm. latum, minutissime pubescens, stipite 1 cm. longe. Guanai, 2,000 ft. (946). Apparently nearest to *B. longifolia.*

Bauhinia splendens, HBK. Nov. Gen. vi. 319. Falls of the Madeira, Brazil (948).

Bauhinia Langsdorfiana, Bong. Mem. Acad. St. Petersb. vi. (IV.). Guanai, 2,000 ft. (947 and 952). Presumably this species, but collected in fruit only.

Bauhinia, species undetermined. Junction of the Beni and Madre de Dios (949).

Bauhinia, species undetermined, not matched at Kew and probably undescribed. Reis, 1,500 ft. (945). Not sufficiently studied; possibly to be referred to another genus.

Copaifera Langsdorfii, Desv. Mem. Mus. Paris, vii. 377. Falls of Maderia, Brazil. (1009).

Piptadenia communis, Benth. Hook. Journ. Bot. iv. 337. Guanai, 2,000 ft. (1306; 1307; 1308).

Piptadenia, a species somewhat related to the last, collected only in fruit. Guanai, 2,000 ft. (1317).

Piptadenia colubrina (Vell.), Benth. l. c. 341. Yungas, 6,000 ft. (1305, in flower) Guanai, 2,000 ft. (1331, in fruit).

Mimosa albida, Kunth, Mim. t. I. Guanai, 2,000 ft. (1297); Yungas, 4.000 ft. (1303). A thornless form.

Mimosa floribunda, Wild. Sp. Pl. iv. 1031. Falls of the Maderia, Brazil (1298). Apparently this species.

Mimosa asperata, L. l. c. 1507. Falls of Madeira, Brazil (1302) Guanai, 2,000 ft. (1301).

Mimosa rufescens, Benth. in Mart. l.c. 362. Mapiri, 2,500 ft. (1304).

Mimosa Boliviana, Benth. Trans. Linn. Soc. xxx. 396. Yungas, 6, 000 ft. (1300); Guanai, 2,000 ft. (1311).

Mimosa Soratensis, Benth. l. c. 427. Sorata, 10,000 ft. (1299).

Acacia Cavenia (Mol.), H. & A. Bot. Beech. 21. Valparaiso, Chili (953).

Acacia Farnesiana (L.), Willd. Sp. Pl. iv. 1083. Sorata 8,000 ft. (2371).

ACACIA LUTEA (Mill). (*Mimosa lutea*, Mill. Dict. No. 18; *A. macracantha*, Humb. & Bonpl. in Willd, l. c. 1080). Junction of the Beni and Madre de Dios (2373).

Acacia, ? sp. Yungas, 6,000 ft. (2372).

CALLIANDRA BOLIVIANA, spec. nova. Sect. Macrophyllæ. Foliola 3-juga, terminalia oblique-ovata, obtuse acuminata, mucronulata, 8-12 cm. longa, 4-nervia, inferiora ovato-rhomboidea, 4-6 cm. longa; petiola 2-4 cm. longa; pedunculi 3 cm.; calyx 3 mm., corolla 8 mm. longa, striata; legumen glabrum, 12 cm. long., 8 mm. lat. Guanai, 2,000 ft. (1314); Mapiri 2,500 ft. (1315).

Nearly related to *C. Guildingii*, Benth. of the West Indies.

Calliandra ? Mapiri, 5,000 ft. (1316). Collected only in fruit. Very similar to if not identical with Glaziou's No. 8451 in Herb. Kew, from vicinity of Rio Janeiro. Also collected only in fruit.

Pithecolobium latifolium, (L.), Benth. in Hook. Lond. Journ. Bot. iii. 214. Junction of the Beni and Madre de Dios (1313).

Pithecolobium trapezifolium, (Vahl), Benth. l. c. 204. Guanai, 2,000 ft. (1318).

Pithecolobium Saman (Jacq.), Benth. l. c. 216. Yungas, 6,000 ft. (2363).

Pithecolobium divaricatum, Benth. l. c. 213. Junction of the Beni and Madre de Dios (2507).

Pithecolobium ? Guanai, 2,000 ft. Specimens too fragmentary for determination (2567).

The Classification of Slight Varieties.

The question of how to deal with minor variations in plants, opened for discussion in the October BULLETIN, is an important one. People sometimes ask what is to become of systematic botany when all the species are named. I always reply that we shall then have to find out what a species is; and this much learned, it will not be strange if future generations will have the pleasure of reconstructing our whole nomenclature. The making of species and varieties is not an end in botany; it is only a means of presenting facts, statistics, upon which the genuine science of systematic botany, when it comes, must be built. Variations are more important than names or systems of naming, and the botanist who regards them as unworthy of recognition does not possess the spirit of modern inquiry. It is just this sort of inquiry which is bound to attract a coming generation of botanists to the study of cultivated plants.

But in the meantime, the slight variations must be named, or at least recorded. Mr. Cockerell's suggestion that in the future such variations be designated by fixed adjectives, is a good one, yet, in practice, it would meet difficulties. "Albiflorus" is generic for white varieties; but these varieties often vary in themselves, White in our loose vernacular is often pink-white, or yellowish-white, or light blue. And whiteness of flower is often correlated with whiteness or other characteristic of stem. If we are to look for causes in these variations, then our nomenclature might rest upon causes rather than parts. It is well known that characters of soil, exposure and culture often induce definite variations. It seems to me that each variation must receive a name fitting to itself, and this name should follow the laws of our botanic nomenclature.

There appears to be no objection to the use of *form* as compared with *variety*. This same difficulty, in regard to cultivated plants, has often troubled me, and I once advised that *forma* be employed to designate slight cultural varieties,* but later it occurred to me that the term had better be left to botany and that *hortensis* (abbreviated to *hort.*) should be used.†

It cannot be expected that all the "forms" of plants could be included in our manuals, nor would it be advisable to insert them there. But record should be made of them, and the time will come when they will be collated. The possibilities of such study are great.

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*Nomenclature of Garden Plants, Country Gent., 1885, 536.

†Agricultural Sci. i. 52.

L. H. BAILEY.

Notes from New Hampshire.

A few notes from the Franconia Mountains may prove of interest. I found on the west side, between here and Lisbon, quite a quantity of *Nardosmia palmata*, of course long out of bloom but recognizable by its large leaf, so beautifully white-felted on the under side. On this road, too, there is any quantity of *Onoclea Struthiopteris*, which I collected for the first time in my life. It grows in Rhode Island, but I never knew it to fruit there. Here it is in splendid condition. The prevailing golden-rods are forms of *S. juncea* and *arguta*, and they vary infinitely. I find also *squarrosa*, *thyrsoidea*, *latifolia*, *bicolor*, *altissima*, *nemoralis*, *Canadensis*, *lanceolata*. I have not the "Synoptical" with me, and so use old terms. Of asters I notice *A. puniceus* as the most common. I find besides *A. cordifolius*, *macrophyllus*, *acuminatus*, *miser* (?). *Rubus odoratus* is abundant and beautiful. *Impatiens biflora* is so common as to give a distinct character to the roadside. It blooms most profusely. A showy feature of the scene is caused by the red berries of *Viburnum Opulus*, here called "high cranberry." I have seen no oaks, chestnuts nor hickories. The mountain ash is frequent.

I have found some interesting specimens of *Osmunda Claytoniana*. Some of the fronds bear fruit in the usual manner. Others, from the same root-stock, produce pinnæ, on the backs of which the naked sporangia are disposed at the ends of the veinlet, and near the edges of the pinnules, much as in *Polypodium*. Some pinnules show an earlier stage of modification, a development of thickened papillæ or hairs, non-differentiated into sporangia.

On August 7th I ascended Mt. LaFayette and collected the following alpines; *Solidago Virga-aurea* var. *alpina*, *Arenaria Groenlandica*, (of course), *Geum radiatum*, var. *Peckii*, nearly out of flower, *Prenanthes Boottii* and *nana*, *Juncus trifidus*, *Agrostis canina*, var. *alpina*, *Carex rigida*, and some mosses. I saw a humming-bird on the summit! Bees and spiders were common. It is odd to see *Spiræa salicifolia* blooming among the alpines, like *Vaccinium Vitis-Idæa*, and *uliginosum* My last ascent of this fine mountain was August 10, 1882, three days later in the season than my climb of this year. The flowers I found then were this year almost all gone to seed. This speaks volumes for the precocity of 1889.

At the limit of trees, or just below the dwarf forest rather, *Veratrum viride* grows vigorously. Rain, wind and cold, are a drawback to collecting. I had only a portfolio; it is my fixed opinion that on mountain tops a tin box is better.

W. WHITMAN BAILEY.

SUGAR HILL, N. H., August 20.

Botanical Notes.

Florida Lichens.—I have lately received from Dr. W. Nylander his work on "*Lichenes Insularum Guineentium,*" and in the "Observationes" attached thereto, he has named and described six new species of Lichens found by me in Florida. They are *Graphis subparilis*, *Graphis interversa*, *Graphis turbulenta*, *Platygrapha subaltingens*, *Lecidea* (*Biatora*) *carneo-albens*, and *Verrucaria* (*Pyrenula*) *subpunctiformis*. These, with the five described in the April number of the BULLETIN, and the additions made by me of already known Florida species, will swell the "Lichen Flora of Florida" published by Eckfeldt & Calkins in 1887 to over four hundred species. I withhold notes upon them for the present, as I am making a special study of the subject with a subsequent contribution in view. W. W. CALKINS.

Aphyllon fasciculatum. Mr. Anderson in his note on *Aphyllon fasciculatum*, in the August number of the BULLETIN, speaks of its being parasitic on *Artemisia*. My experience has been like his. It is found in small quantities not far from the shore of Lake Michigan, at a locality in northern Indiana, a few miles from Chicago. A gentleman who had collected *Aphyllon fasciculatum* there assured the writer that it was parasitic on *Artemisia*, but a careful search failed to reveal it in the locality where he had found it. Later it was found growing in the sand with *nothing else near* except *Arctostaphylos Uva ursi*, on which it was possibly parasitic, though we failed to demonstrate that. We were especially careful in noting the surroundings, because one purpose of our visit was to prove or disprove its parasitism on *Artemisia*.

EVANSTON, ILL., Aug. 15, 1889. L. N. JOHNSON.

Rose specimens for M. Crépin. Dr. G. N. Best requests those having specimens of North American Roses to be sent to Brussels for M. Crépin, to transmit them to him by mail at Rosemont or by express at Centre Bridge, N. J., not later than Jan. 1st.

A Correction. The statement on page 286 of the November BULLETIN, that *Lobelia Dortmanna*, *Utricularia intermedia*, *Limnanthemum* and *Eriocaulon septangulare* were new to the Flora of Ontario, when collected at Lake Muskoka by members of the Botanical Club of the American Association, ought not to have been made, for all these had previously been collected and even recorded in Professor Macoun's Catalogue. Our apologies are due him and his diligent colleagues for this inadvertence. *Subularia* and *Elatine* were, however, unrecorded from the province.

Reviews of Foreign Literature.

British Moss-Flora. R. Braithwaite. Part XII.

This portion completes one-half of the work, and includes *Zygodon*, *Orthotrichum*, *Weissia* and *Schistostega*. The treatment of that difficult genus *Orthotrichum* is based principally on that of Lindberg (1866), and derives many good points from Venturi (1887), figures of the stomata and cross-sections of the leaves being given in all cases. Of the thirty-three species included in Lesquereux' and James' Manual fourteen are native of England also, so that much help may be obtained by a study of Dr. Braithwaite's work; also the key to the species will be found of great assistance. The following changes from the Manual may be noted:—*O. Sturmii*, Hornsch., is reduced to a variety of *O. rupestre*, Schleich.; *O. leiocarpum*, Br. and Sch., returns to its old name, *O. striatum* (L.), Hedw.; *O. fallax*, Schimp., is *O. Schimperi*, Hammar; *O. strangulatum*, Beauv., is reduced to a synonymn of *O. cupulatum*, Hoffm. It will be seen from this that Dr. Braithwaite does not adopt Lindberg's *Dorcadion* for *Orthotrichum*, but he does take up Ehrhart's *Weissia* for *Ulota* and six of the species are ours also.. *Ulota Hutchinsiæ* changes to *Weissia Americana* (P. Beauv.), Lindb.; *U. Ludwigii* to *Weissia coarctata* (P. Beauv.), Lindb.; *U. Drummondii*, Brid., to *W. Drummondii* (Hook. and Grev.), Lindb.; *U. Bruchii* to *W. Bruchii* (Hornsch.), Lindb.; *U. phyllantha* to *W. phyllantha* (Brid.), Lindb.; and *U. crispa* becomes *W. ulophylla*, Ehrh., and includes *U. crispula* as a variety. We rejoice in this combination and think that Mitten's *U. Americana* should also be included. More prominence is given to general characters than to minute variations of the capsules and peristome, and the result is great clearness and simplicity. E. G. B.

Aerenchyma: A New Paper on Plant Aeration.—In a recent number of pringsheim is an article by Dr. H. Schenck of Bonn University, entitled "Aerenchym a tissue of swamp plants homologous with cork in land plants." In this paper are given the results of the study of a large number of swamp plants belonging to nine different families, which he examined with respect to the peculiar tissue which he characterizes as Aerenchym. This tissue is peculiar first in respect to its origin, second its function.

The author claims that to the various kinds of tissue developed by the phellogen must be added this one. With the exception of the roots of *Jussiæa*, this tissue comes exclusively from the phellogen layer; in the roots of this genus the original rind cells form a part of it, but these are added to and completed by cells developed from the phellogen.

As to its function, it is claimed that as this tissue is invariably produced by plants belonging to very different families whenever these plants are subject to certain conditions, it is therefore probable that its function is in all cases one and the same. This function, he says, is that of supplying the submerged part of the plant with the necessary oxygen for respiration. It is held by certain other botanists that in a number of these plants the tissue performs the office of swimming organs.

In answer to this, he says the "aerotropische" roots of *Jussiæa Peruviana* cannot be considered as swimming organs, and that those free swimming plants related to this may have inherited the tendency to produce this tissue, although at present no longer requiring it for breathing purposes. These roots he describes as a second form, springing from the submerged stem, and growing upward toward the surface of the water; he compares them to those of other water plants which appear to have a similar means of furnishing themselves with a larger supply of oxygen than that furnished by ordinary means; among these he mentions the Cypress knees, or aerial roots of *Taxodium*.

In a supplementary note to this article the author says, that through the kindness of Mr. Pammel, of St. Louis, he has learned that plants belonging to the family Lythraceæ develop this tissue when growing in swampy places in Missouri, U. S. A. As an example he gives *Nesæa verticillata*, with a short description of its anatomy. To this brief mention of the American plants of this family may be added a notice printed five years ago in the BULLETIN by Dr. Britton, in which he called attention to this peculiar tissue in *Nesæa verticillata*, now so carefully described by Prof. Jos. Schrenk. E. L. G.

BARNARD COLLEGE, Nov. 15.

Index to Recent American Botanical Literature.

Agarics—North American. Robert K. Macadam. (Journ. Mycol. v. 135–141, continued).

Thirteen species of the genus *Russula* are described.

Algis et Characeis—De. Otto Nordstedt. (Aftryck af Lunds Universitets Arsskrift, Tom. xxv. Pamph. 4to, pp. 40, illustrated).

Part three contains descriptions of two new Brazilian desmids, *Gynozyga armata* and *Desmidium curvatum*, both figured.

Araucaria imbricata. (Garden, xxxvi. 370, 371, illustrated).

Boleti of the United States. Chas. H. Peck. (Bull. No. 8, N. Y. State Museum, Pamph. 8vo. p.p. 166, Albany, 1889).

Some one hundred species are enumerated, included in the three genera *Boletinus*, *Boletus* and *Strobilomyces*. The work is well and clearly printed, with ample margin to the pages, and is a credit to both author and printer.

Bonduc Seeds. H. H. Rusby. (Reprint from Drug. Bull., Oct. 1889, illustrated). *Cæsalpinia Bonducella* and *C. Bonduc* are figured.

Botanical Club of the A. A. A. S (Bot. Gaz. xiv. 262–268).

An account of the proceedings of the club at the Toronto meeting.

Botanical Latin—As regards some. Roscoe Pound. (Am. Nat. xxiii. 444, 445).

An earnest plea for consistency in the use of Latin spelling in botanical names. The author says in concluding: "It will be noticed that those who retain eighteenth century Latin do so consistently, while those who attempt to substitute classical forms do it capriciously and without system. There seems no good reason for this, and it is probably largely due to carelessness. At any rate, if Pyrus is to be spelled with an i, so should sylvaticus, sylvanus and sylvestris, and the latter should have the termination ter. If eighteenth century forms are to be retained we should write lachrymans; otherwise lacrimans. We cannot split the difference in this matter."

Botany as a Disciplinary Study. Gerald McCarthy. (Journ. Elisha Mitchell Sci. Soc. vi. 33–38).

Botany in the American Association. (Bot. Gaz. xiv. 258-262, illustrated).

Titles and abstracts are given of the papers referring to Botany and Palæobotany presented at the Toronto meeting.

Bur Oak—The. C. S. S. (Garden and Forest, ii. 497, fig. 136).

A description of *Quercus macrocarpa*, with special reference to its distribution.

Carices—Notes on some British. Arthur Bennet. (Journ. Bot. xxvii. 330-335).

The title of this paper would scarcely indicate that it should be noticed under American botany, but it is, in fact, a review, in a very friendly spirit of Professor Bailey's recent "Studies of the Types of American Carices," published in the first number of the MEMOIRS, in so far as it relates to British species. His remarks under *C. flava* are reprinted *in éxtenso.* Mr. Bennett notes that the name *C. Goodenovii*, Gay, is three years older than *C. vulgaris*, Fries, and must be adopted for that species. Finally, he remarks, "Altogether Professor Bailey's paper is one of the most valuable that has ever been contributed to the elucidation of the genus."

Carludovica rotundifolia. J. D. H. (Bot. Mag. Tab. 7083).

Cicuta—Vegetative Characters of the Species of. Edward L. Greene. (Pittonia, ii. 1-11; advance sheets).

The recently published revision of North American Umbelliferæ has evidently induced Professor Greene to examine the West coast species of the order rather carefully, and his results on one genus are here presented. He has already protested against the reference of *C. Californica* and *C. maculata* to varieties of *C. virosa*, of whose occurrence in America he has as yet no proof, and his recent field studies of the plants over a large area of the West has assured him of their specific distinctness. Root characters are taken as the basis of primary classifications, one group of species having a short, erect root axis, and another the root horizontal. In the first section he places *C. virosa*, L., of the Old World; *C. Bolanderi*, Wats.; *C. occidentalis*, n. sp. of the Rocky Mountains and Sierra Nevada; *C. purpurata*, n. sp. from the Yakima River, Washington, which may be *Sium? Douglasii*, DC.; *C. maculata*, L. and *C. bulbifera*, L. The other section is composed of *C. vagans*, n. sp. from Lake Pend d'Oreille, Idaho, and *C. Californica*, Gray.

N. L. B.

Coco, Cacao and Coca. F. L. Sargent. (Pop. Sci. News, xxiii. 135, 136, 151, 152).

An exposition of the confusion in regard to the above names, given respectively to *Cocos nucifera*, *Theobroma Cacao* and *Erythorxylon Coca.*

Coloring Principles of Flowers—A Contribution to the Knowledge of the. W. T. Wenzell. (Pharm. Rec. ix. 314-316, illustrated).

Contribution to West American Botany. II. C. R. Orcutt. (West Amer. Sci. vi. 137).

Pholisma arenarium, Nutt., and *Ammobroma Sonoræ*, Torr., are described. Both are said to be used as food by the Indians.

Copernicia cerifera. Theo. Peckolt. (Pharm. Rundsch. vii. 263-266, illustrated).

Dasylirion acrotrichum. (Garden, xxxvi. 405, illustrated).

Devonian Plants from Ohio. J. S. Newberry. (Journ. Cincinnati Soc. Nat. Hist. xii. 48-56; plates iv. v. and vi.), (also reprinted).

Caulopteris antiqua, *C. peregrina*, *Dadoxylon Newberryi*, *Lepidodendron Gaspianum* and *Sphenophyllum vetustum* are described and figured—the latter as a new species.

Flora Brasiliensis.

Fascicles 104, 105 and 106 have recently been received. They complete Volume vi. Part VI., the second instalment of the Rubiaceæ, by Dr. Karl Schumann of Berlin, and Vol. xii. Part I, including the Malpighiaceæ, by Grisebach, Erythroxylaceæ, by Peyritsch, Hypericaceæ, by Reichardt, Marcgraviaciæ, by Wittmack, Ternstrœmiaceæ, by Wawra, Rhizoboleæ, by Wittmack, Dichapetaleæ, by Baillon, Guttiferæ and Quiinaceæ, by Engler, Moringaceæ, by Urban and Napoleonaceæ, by Eichler. The first of these was published in 1858, so that this volume has been over thirty years in course of publication. N. L. B.

Flora of the Alamo. C. R. Orcutt. (West Am. Sci. vi. 132-134).

Forests of Vancouver's Island—The Mountain. John Macoun. (Garden and Forest, ii. 525).

Fungi—New and Rare Species of North American. J. B. Ellis and B. M. Everhart. (Journ. Mycol. v., 145-157).

Sixty-four new species and varieties are described.

Fungi—New Species of Kansas. J. B. Ellis and W. A. Kellerman. (Journ. Mycol. v. 142-144).

Twelve new species and varieties are described.

Glaziophyton mirabile. M. A. Franchet. (Journ. de Bot. iii. 277-281, illustrated).

An illustrated description of a new genus and species, native of Brazil.

Grasses of Roane Mountain—The. F. L. Scribner. (Bot. Gaz. xiv. 253-255, illustrated).

An enumeration of the species observed in July. *Agrostis rupestris*, Chapm., is figured.

Griffinias. (Garden, xxxvi. 386, 387, illustrated).

A full-page colored plate is given of *G. hyacintha* and a cut of *G. Blumenaria.*

Gymnogramme schizophylla. (Garden and Forest, ii. 532, 533, Fig. 140).

Jamaica.—Bulletin No. 15 *of the Botanical Department.* (Pamph. 4to. pp. 8, Government Printing Est., Kingston).

Contains memoranda upon sugar cane, *Cinchona*, *Coca*, and the various plants used for the extraction of "Sisal Hemp."

Lepidium Virginicum, L., in Italia.—Ancora Sulla Subspontaneita. L. Micheletti. (Giorn. Bot. Ital. xxi. 523, 524).

Lessons in the Structure, Life and Growth of Plants for Schools and Academies. By Alphonso Wood; revised and edited by Oliver R. Willis. (8vo. pp. 220, New York, 1889).

This book contains the introductory portions of Dr. Wood's famous "Botanist and Florist," revised and, in part, entirely rewritten by Dr. Willis, and issued in a very attractive form. The original edition was published over twenty years ago. The progress of knowledge concerning all the more minute portions of vegetable structures has been so great during that period that what was then written has now become, to a very considerable extent, erroneous, and correction and emendation have been necessary parts of the editor's work. We have examined the book carefully and can say without hesitation that he has done it well, and that it will stand comparison with anything of the same scope which has preceded it. The type is beautifully clear, the illustrations, for the most part, capital (we do not like No. 526), and many of them new, and the treatment of the subject clear and concise. We congratulate Dr. Willis and his publishers on the production of a school book which must have a large sale. N. L. B.

Lythrum.—The Genus, in California. Edward L. Greene (Pittonia, ii. 11–13: advance sheets).

L. Californicum, T. & G., the widely distributed West Coast species is now supplemented by *L. Hyssopifolia*, L. from two localities and the charge made that it is obscurely lurking and rare, which is quite as true of it on the east side of the continent; *L. adsurgens*, n. sp., from meadows near San Francisco Bay, and *L. Sanfordi*, n. sp. from Stockton.

Mucronoporus.—A New. J. B. Ellis and B. T. Galloway. (Journ. Mycol. v. 141, 142, Pl. XII.) *M. Everhartii* is figured and described.

Nymphæaceæ.—On the. George Lawson. (Trans. Royal Soc. Canada, vi. Sec. IV. 97-125; reprinted).

This is an extended paper on the structure, nomenclature and classification of the genera and species of this natural order, consisting essentially of a critical review of the recent writings of Professor Greene, Mr. Jas. Britten and others, a discussion of the names to be adopted, in which the priority of specific and generic names is rigidly maintained, and a synoptical list of them given. This list would be a little more perfect if Professor Lawson had more rigidly applied the very principles for which he so forcibly contends. Or is it a patriotic feeling which causes him to write *Victoria regia*, Lindl. (1838) rather than *V. Amazonica* (Poepp.), Planch., (*Eurale Amazonica*, Poepp. (1832))? And why *Nelumbo speciosa* when this name is antedated by *N. nucifera*, Gærtn? *Castalia odorata* is not to be attributed to Greene, but rather to Woodville and Wood in Rees' Cyclopedia, to which exceedingly rare work Professor Lawson appears to have access. In some curious way no reference is made to *C. Leibergii*, Morong, perhaps the most critical North American species, and I suppose it must have been overlooked. The specimens referred to *C. odorata*, var. *minor*, preserved in the herbarium of the Geological Survey at Ottawa, are the same in which I recognized the *C. tetragona* of Japan and the Himalayas. *Nymphæa Fletcheri* is the name given to a supposed hybrid of *N. advena* and *N. microphylla*, recognized by Professor Caspary, collected by Mr. Fletcher near Ottawa. N. L. B.

Orcadella operculata,—A new Myxomycete. Harold Wingate. (Proc. Phil. Acad. Sci. 1889, 280, 281, one figure).

A new genus and species of slime-mould collected on the trunks of living red oaks about Philadelphia and in Maine.

Paraguay and its Flora.—II. Thos. Morong. (Bot. Gaz. xiv. 246-253).

Peronosporaceæ.—A List of the Kansas Species of. W. T. Swingle. (Reprinted from Trans. 20th, 21st, Ann. Meetings Kans. Acad. Sci., Nov. 1, 1889).

Contains, besides the list of fungi, a complete bibliography and list of host plants.

Pickerel Weed Pollen.—Byron D. Halsted. (Bot. Gaz. xiv. 255-257, illustrated).

Pinus latifolia. C. S. Sargent. (Garden and Forest, ii. 496, fig. 135).

A new species, discovered in the Santa Rita Monntains in 1887, by Dr. Henry Mayr. Its affinities are with *P. ponderosa* and *P. macrophylla.*

Protoplasm and Its History. Geo. L. Goodale. (Bot. Gaz. xiv. 235-246).

The address delivered by the author as Vice-President of the Biological Section of the A. A. A. S. at the Toronto meeting.

Pyrenomycetes.—Contributions to the History of the Development of the. Franz Von Tavel. (Journ. Mycol. v. 113-123, Pl. XI, continued).

Fenestella Platani is described as a new species.

Rosa Engelmanni, Watson.—Observations sur le. Francois Crépin. (Comp. Rend. des. Séances, Soc. Royal de Bot. de Belg., Année 1889, 93-95).

The author again takes issue with Dr. Watson, this time over the species *Rosa Engelmanni*, which is declared to be only a variation of Crépin's *var. Bourgeauiana* of *R. acicularis*, Lindl. His concluding sentence reads: " *R. Engelmanni* will have therefore the fate of those ephemeral specific creations of which the names are condemned to descend to the rank of simple synonyms."

Scientific Names.—The Pronunciation of. C. E. Bessey. (Am. Nat. xxiii. 445, 446).

The author here gives the rules of pronunciation as used in the Botanical Seminar of the University of Nebraska.

Shortia galacifolia. (Bot. Mag. Tab. 7082).

Sphærotheca upon Phytoptus Distortions.—Another. Byron D. Halsted. (Journ. Mycol. v. 134).

Sphærotheca pruinosa is mentioned as having been found in malformed inflorescences of *Rhus glabra.*

Species.—New or Noteworthy. VI. Edward L. Greene. (Pittonia, ii. 13-17; advance sheets).

Platystemon crinitus and *Viola pinetorum* are new species from Kern County, Cal.; *Viola chrysantha*, Hook. is shown to be antedated by *V. chrysantha*, Schrad., and the name *Douglasii* is proposed for the Western N. A. species, while *V. chrysantha* Phillippi, still more recent, is made *V. Philippiana;* there are notes on *Rhamnus rubra*, Greene, and *R. occidentalis*, Howell, both of which are maintained as species in opposition to the views of Prof. Trelease: *Ceanothus connivens*, n. sp., was collected by the author during last June in Calaveras Co., and adds another member to the Cerastes group of the genus. *Sericocarpus tomentellus*, Greene, Pitt. i. 283, is changed to *Aster brickellioides*. N. L. B.

Spiræa Millefolium. (Garden and Forest, ii. 508, fig, 137).

Staphylea Bolanderi. (Garden and Forest, ii. 544, fig. 142).

Trillium grandiflorum. (Garden, xxxvi. 394, illustrated).

Viburnum lantanoides. (Garden and Forest, ii. 531, 532, fig. 141).

Xylobium leontoglossum. (Bot. Mag. Tab. 7085).

Proceedings of the Club.

The regular meeting was held at Columbia College, Nov. 12, the Vice-President in the chair and forty persons present.

The death of Miss Shattuck, and that of Prof. Leo Lesquereux, the distinguished bryologist, both Corresponding Members of the Club, were announced.

The following papers were read:

"Plant Notes from Tadousac and Temiscouata Co., Canada," by J. I. and Alice R. Northrop; illustrated by specimens.

"On the Floating tissue of *Nesæa verticillata*," by Prof. Schrenk; illustrated by slides showing the growth of this peculiar structure.

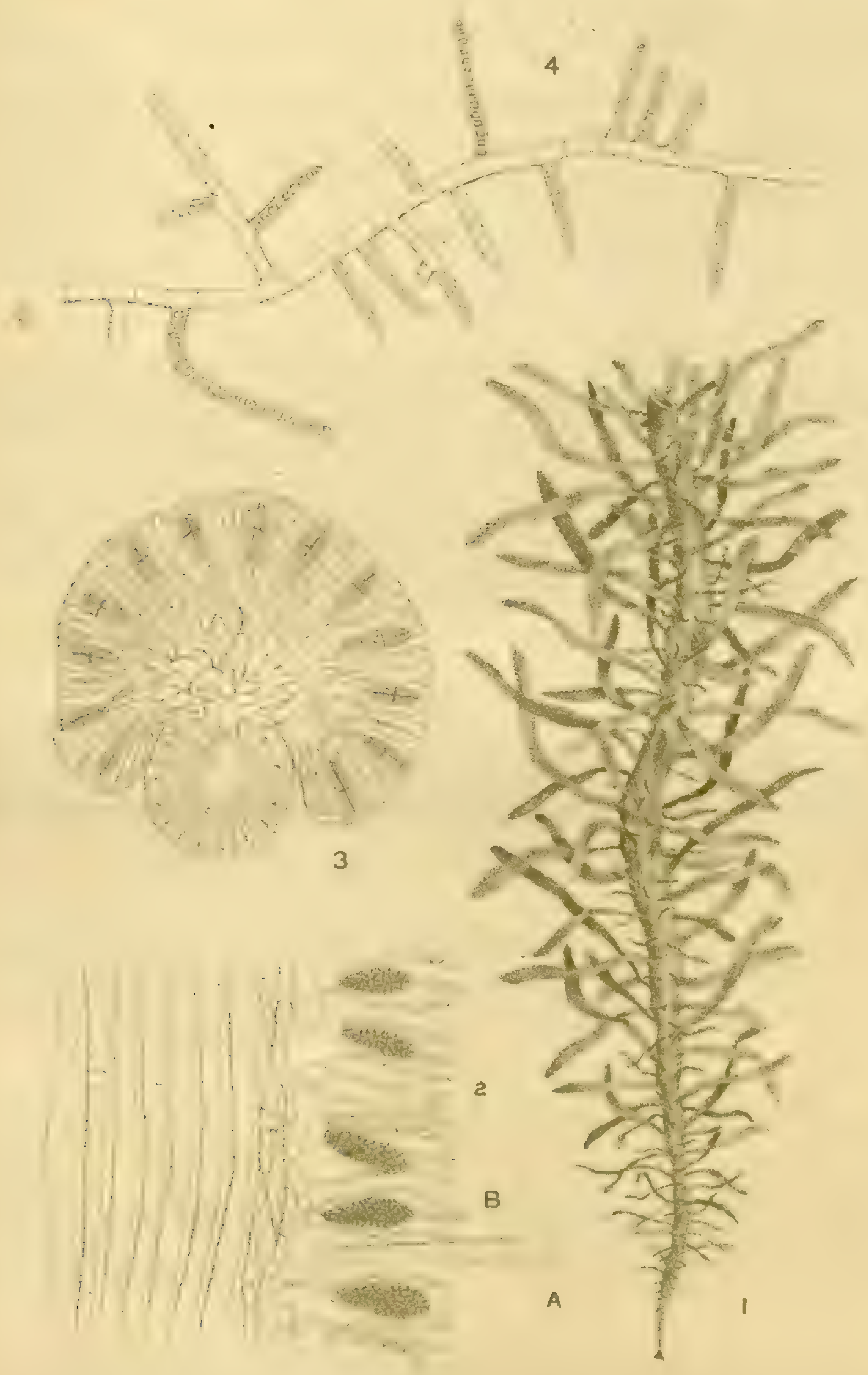
Dr. Britton spoke of a similar tissue in the new *Rhexia aristosa*.

Apple blossoms gathered the same day at Bay Ridge were shown, and the second flowering of fruit trees so noticeable this fall commented upon.

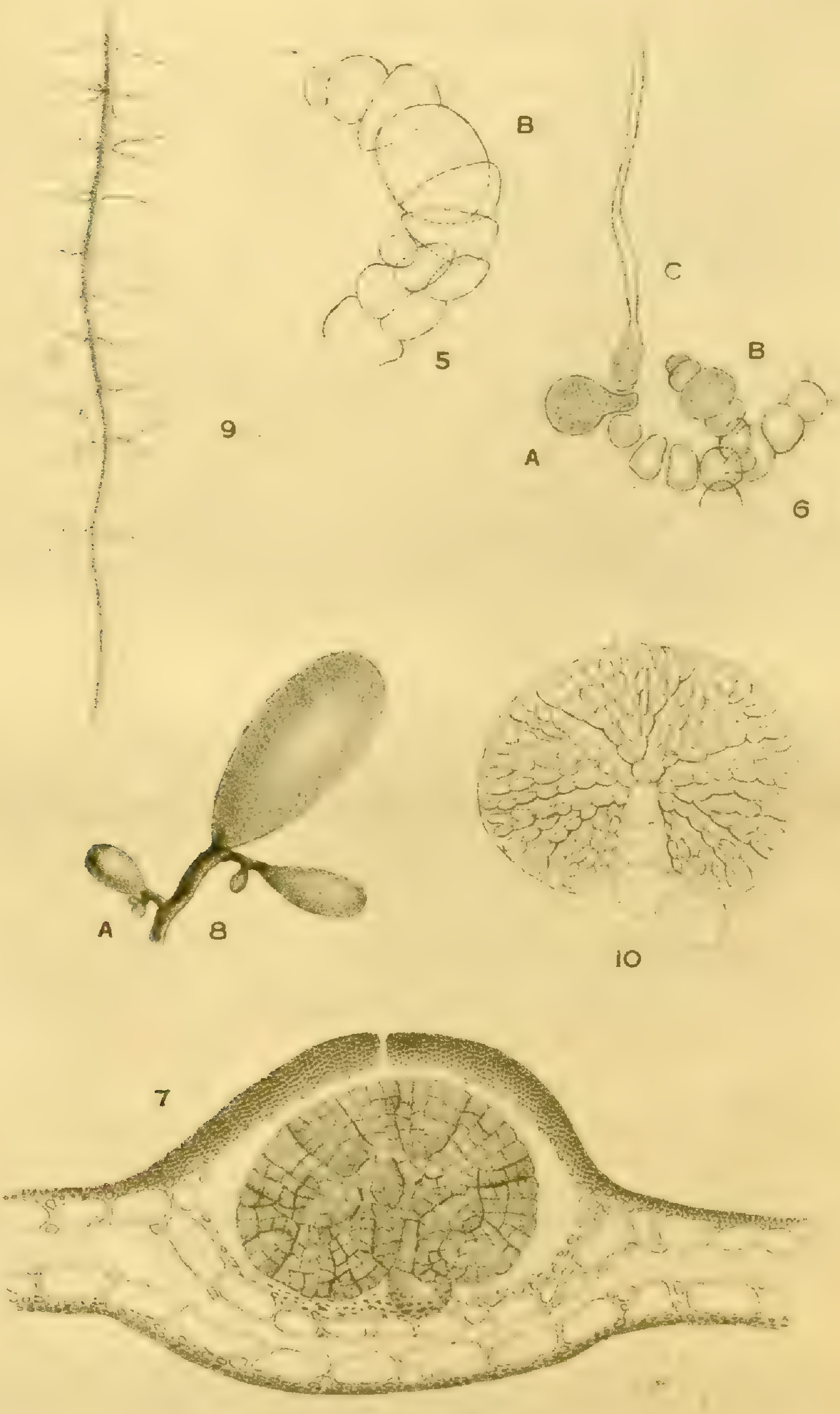
The adjourned meeting of Nov. 25, failed of a quorum on account of the violent storm.

Mrs. Britton exhibited specimens of *Grimmia Hartmani* in fruit, and new to North America, collected by Mr. J. B. Leiberg on summits of the Chilco Range, Idaho. Also, *Bryum lucidum*, a new species of the section *Rhodobryum*, nearest *B. roseum*, collected by Mr. Leiberg in Kootenai Co., Idaho, by Mr. R. S. Williams on Tiger Butte, Mont., and by Professor Macoun on the summit of the Gold Range, B. C.

PLATE LXXXVII



ON SOME MARINE ALGÆ. W.G. FARLOW.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ON SOME MARINE ALGÆ. W. G. FARLOW.

Bulletin of the Torrey Botanical Club. Plate LXXXIX.

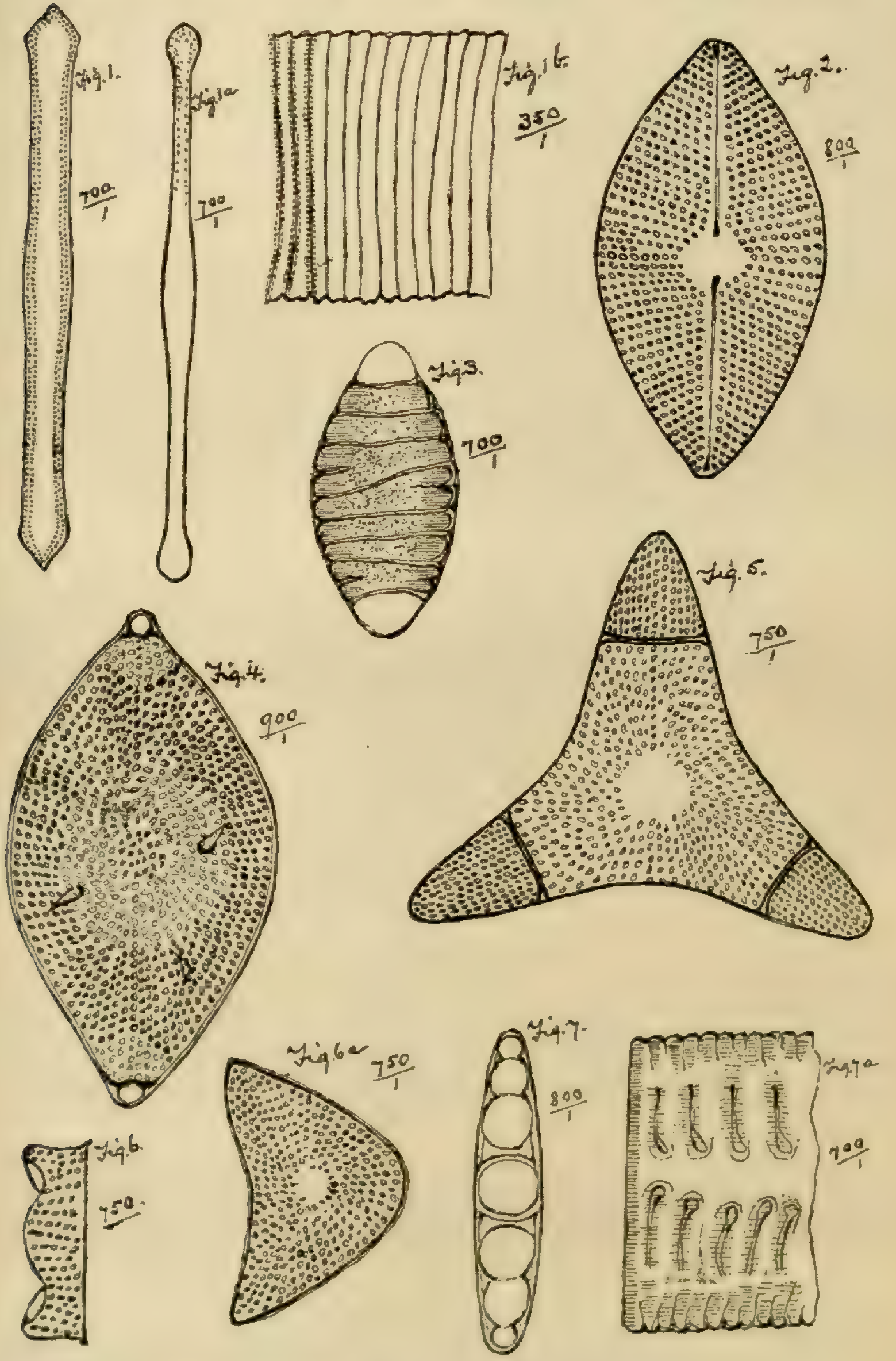
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Fig. 6a
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E. A. S. ad. nat. delin. 1889.

Diatoms from Atlantic City, N. J.

By C. Henry Kain and E. A. Schultze.

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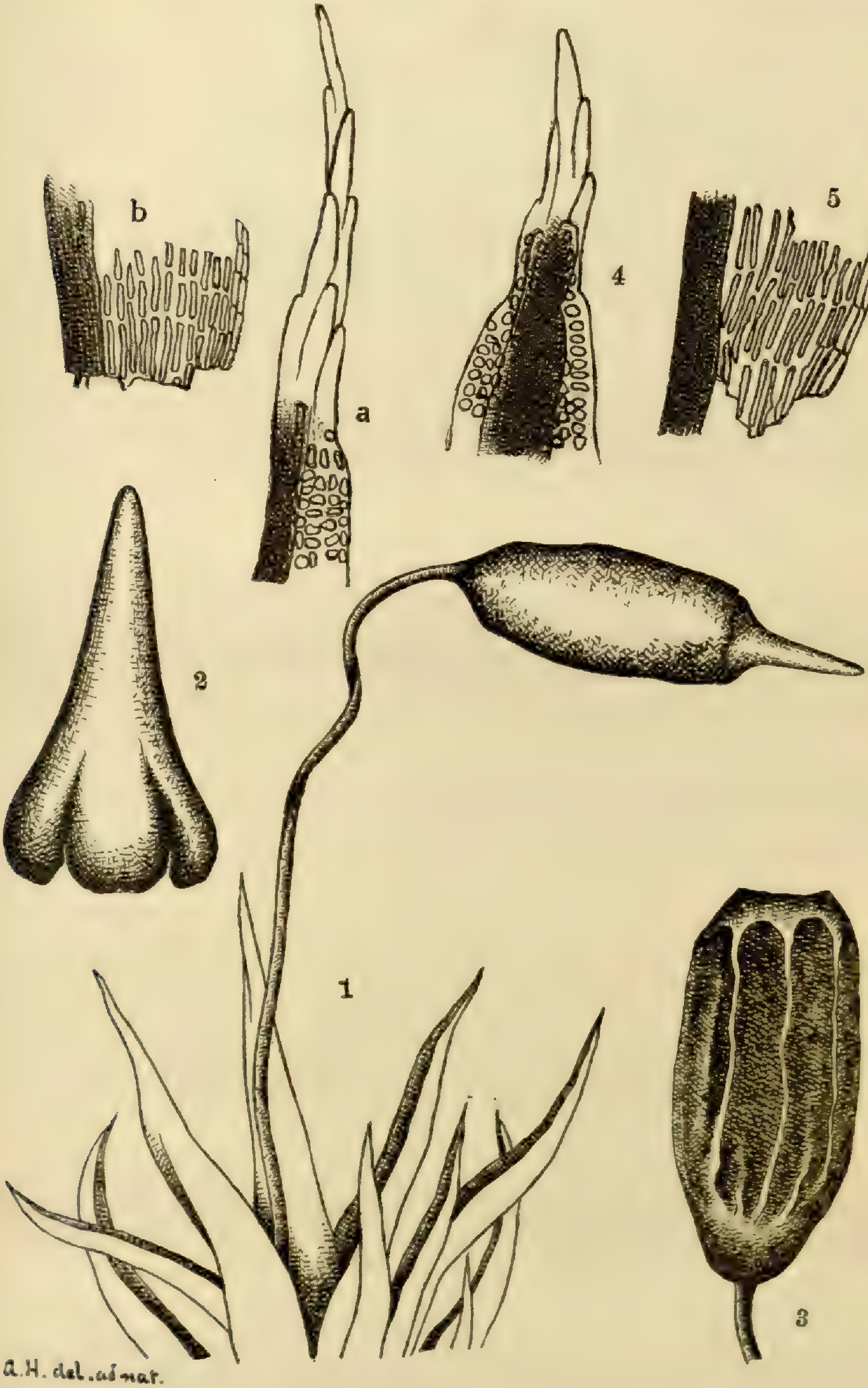
Diatoms of Staten Island.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Grimmia torquata, Hornsch.

Bulletin of the Torrey Botanical Club. Plate XCII.

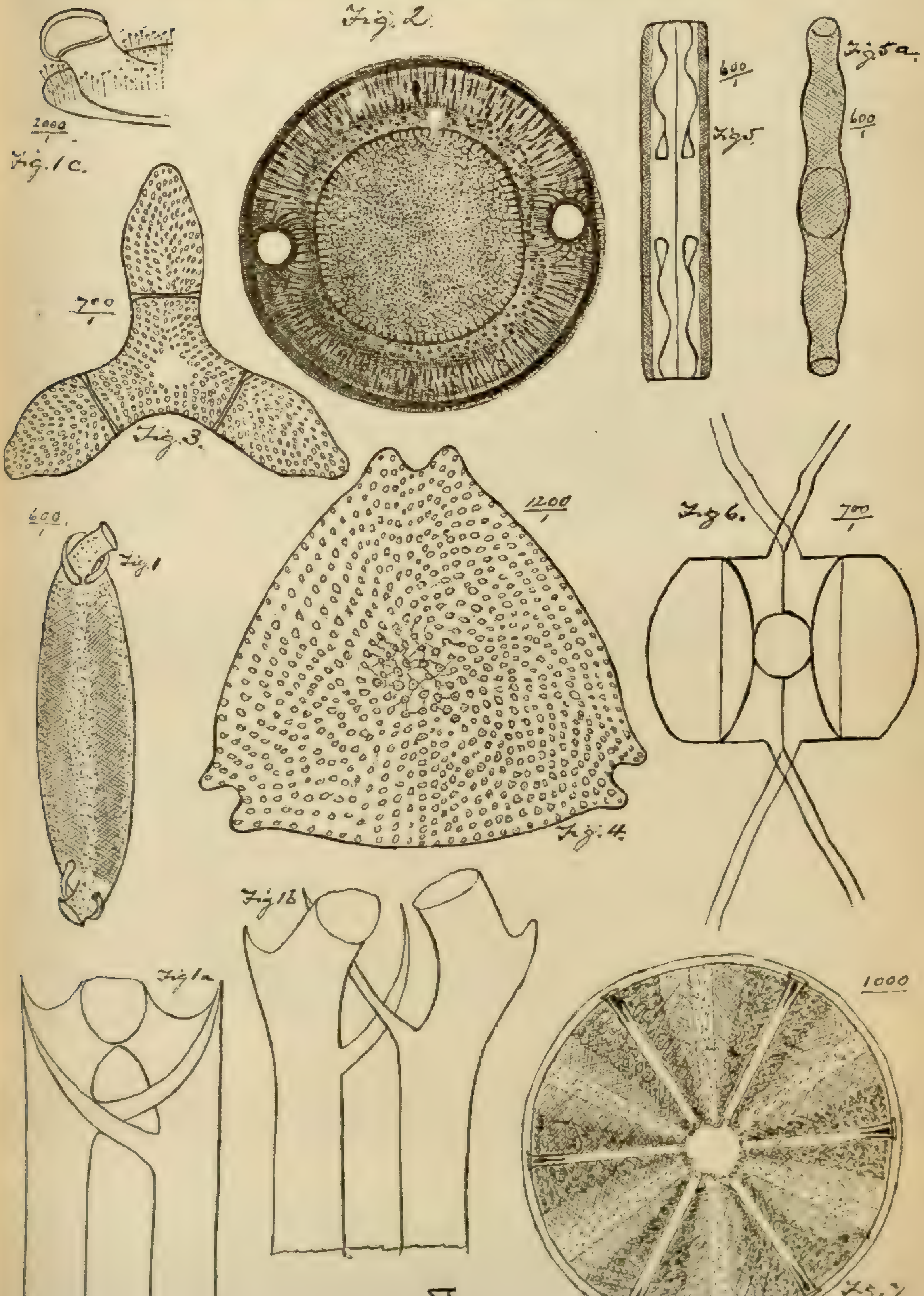
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Fig. 1
Fig. 4.
Fig. 1b
Fig. 1a
1000
Fig. 7

Diatoms from Atlantic City, N. J.
By C. Henry Kain and E. A. Schultze.

Fig. 1.
650/1
650/1
Fig. 2a
Fig. 3 a.
700/1
650/1
Fig. 5.
1200/1
600/1
Fig. 2.
Fig. 4.
700/1
Fig. 3.

Diatoms from Atlantic City, N. J.

BY C. HENRY KAIN AND E. A. SCHULTZE.

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Nasturtium lacustre.

ON NESAEA VERTICILLATA. JOS. SCHRENK.

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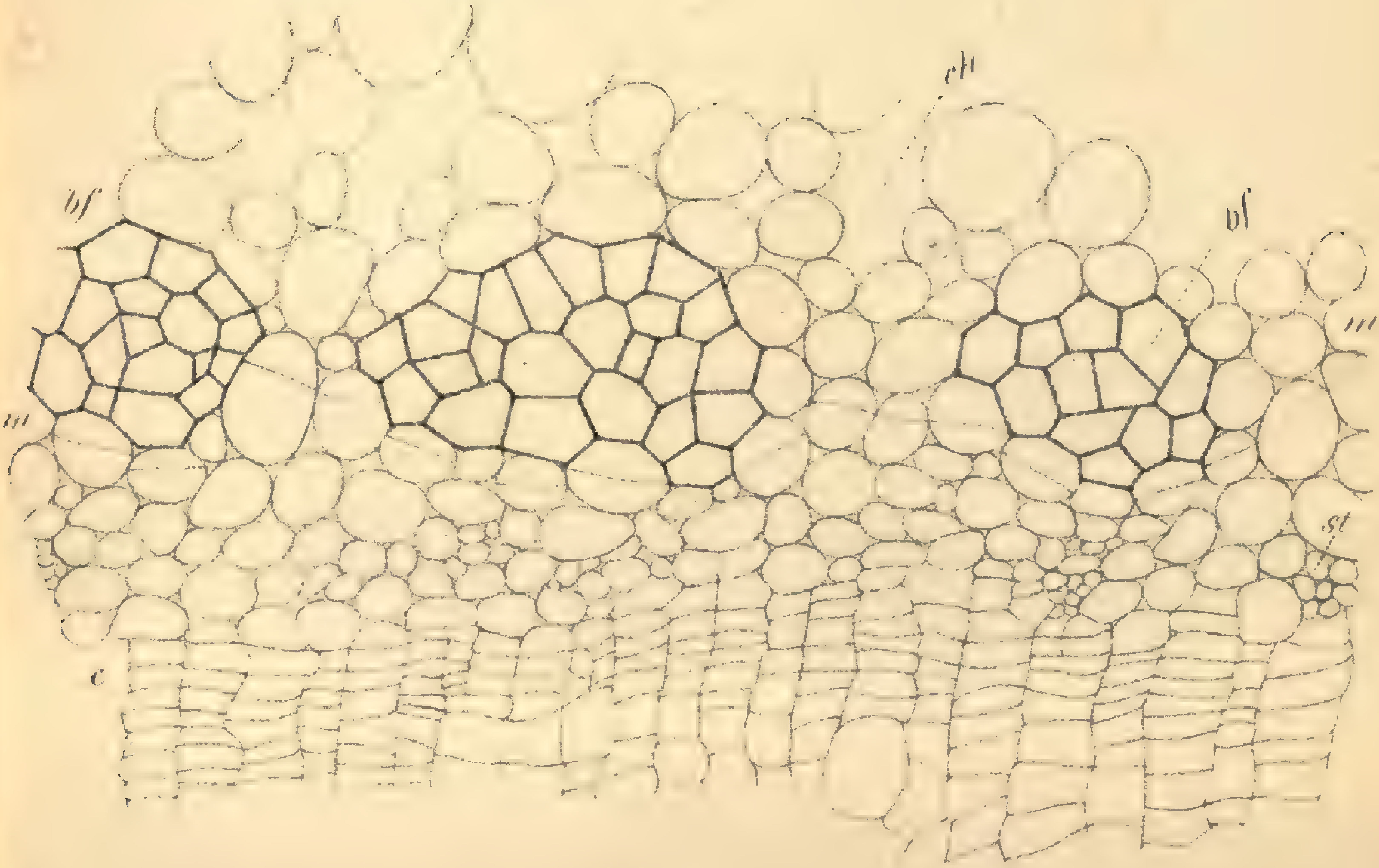
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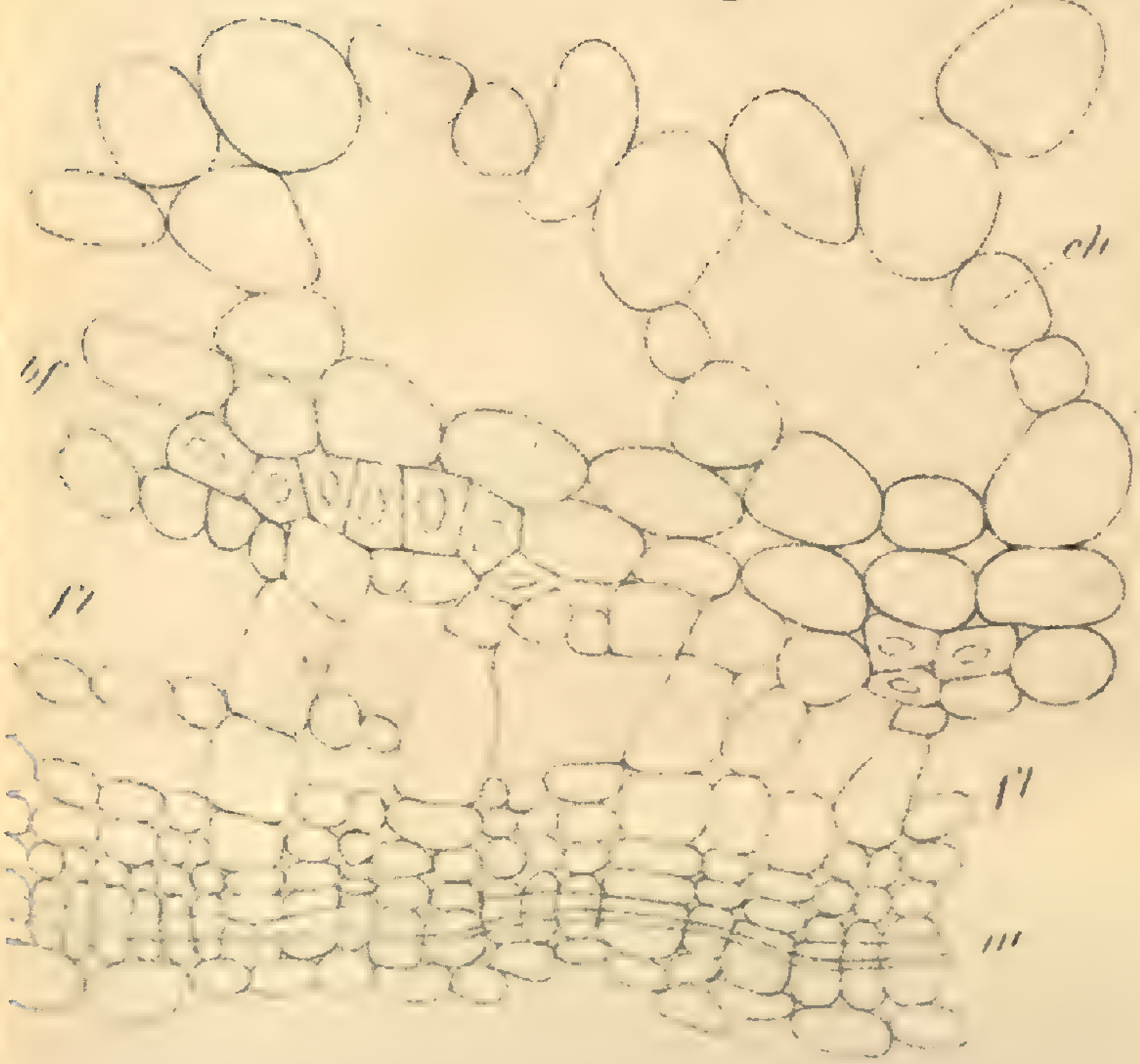

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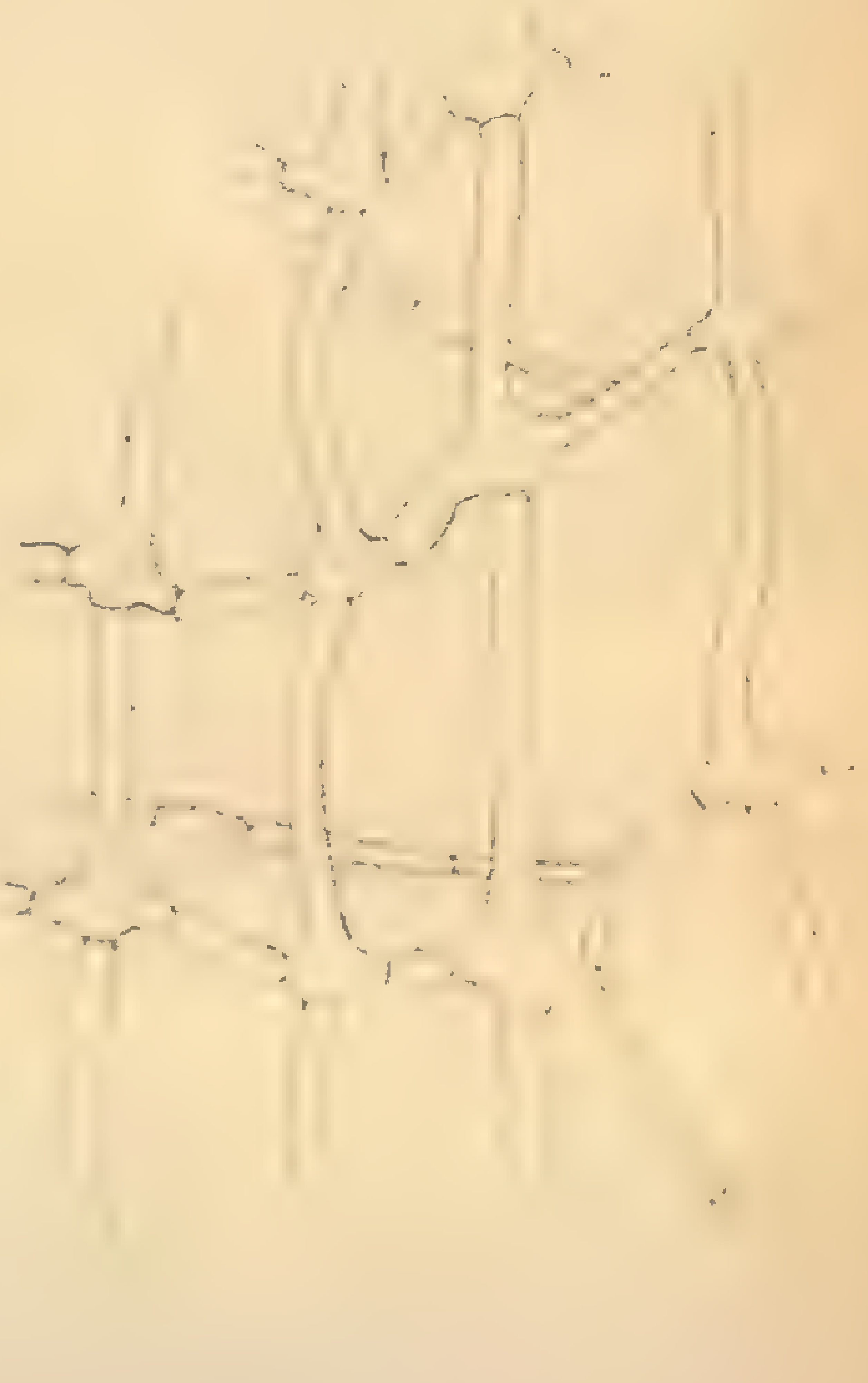

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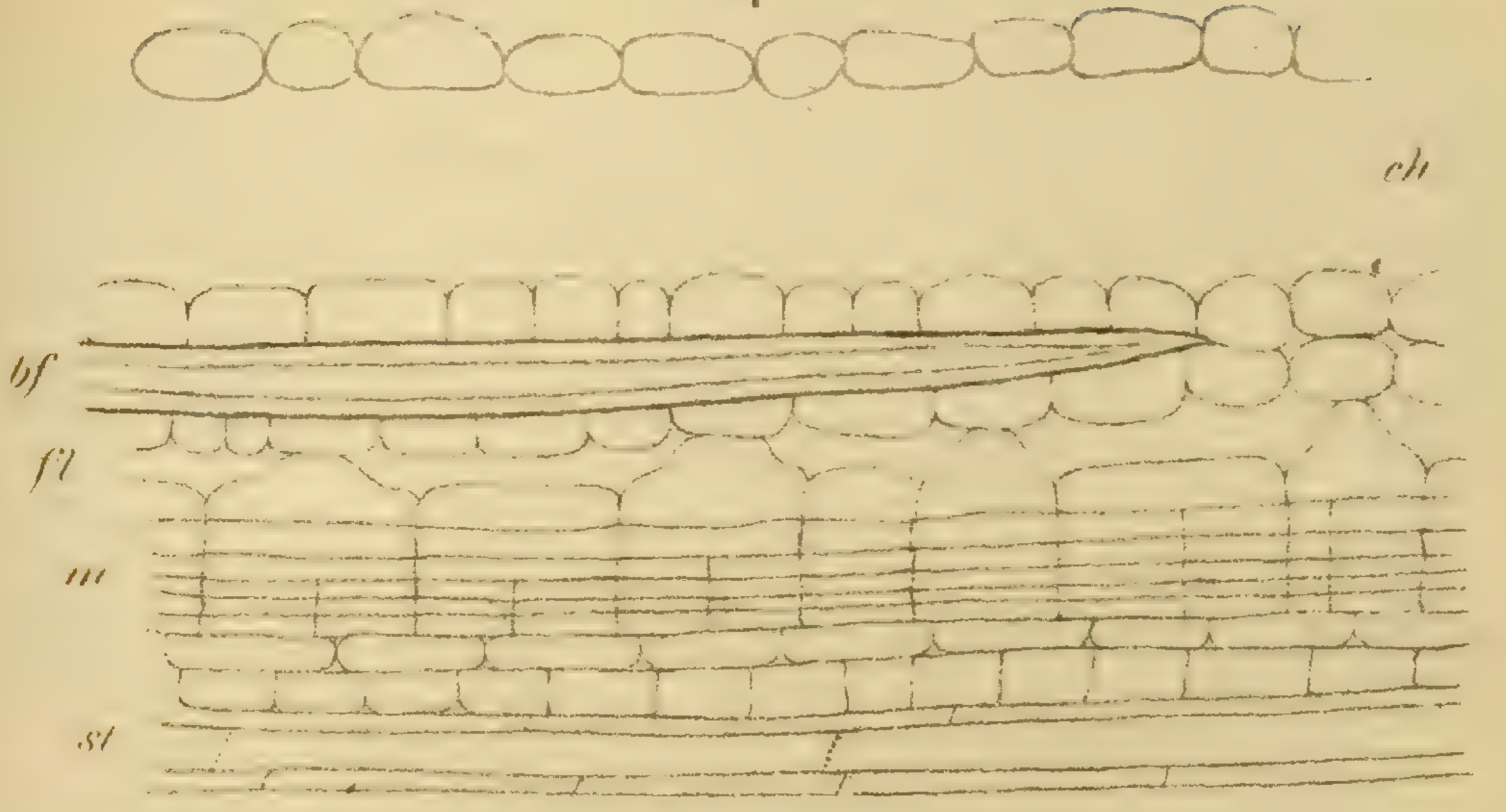

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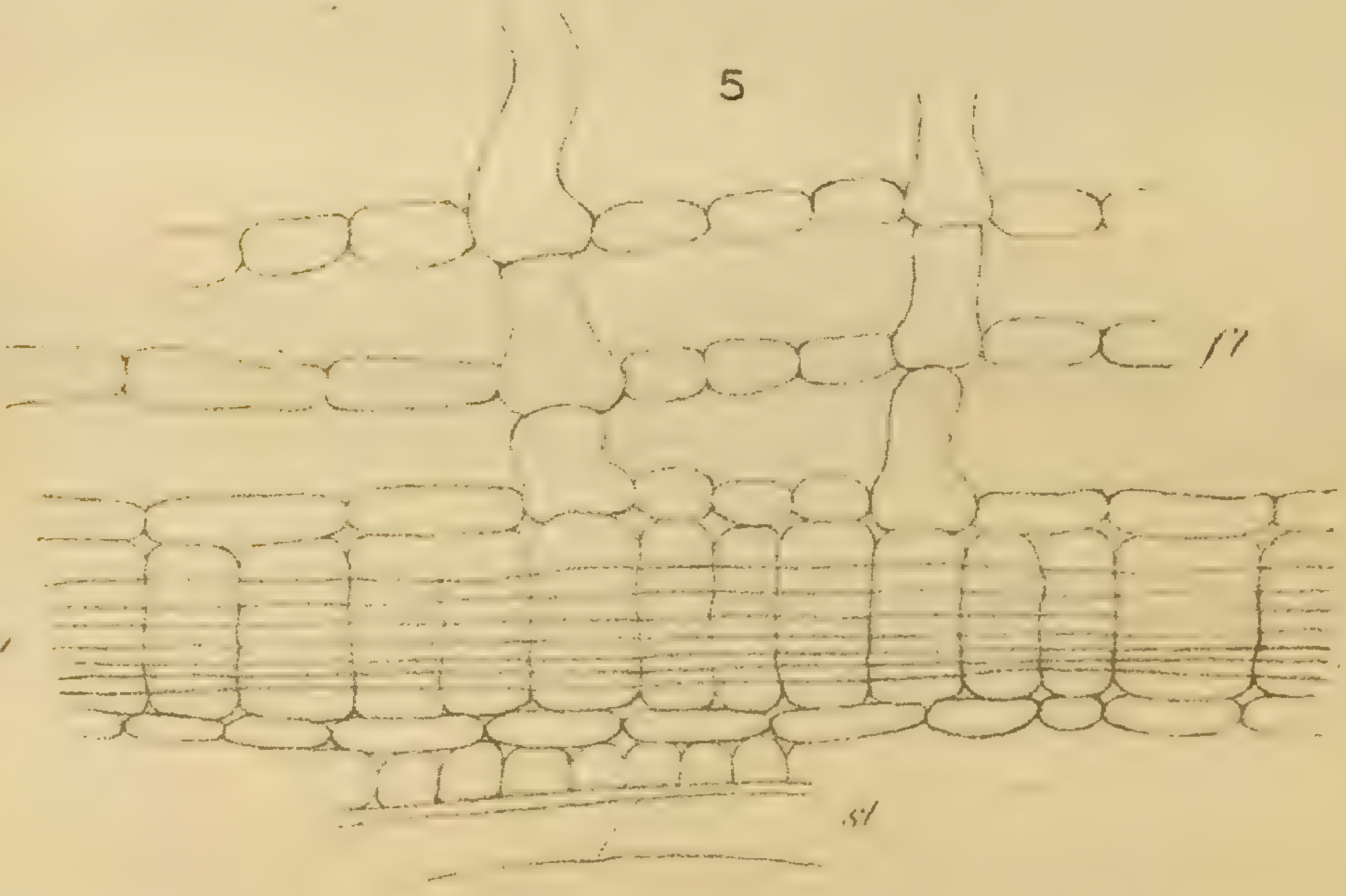

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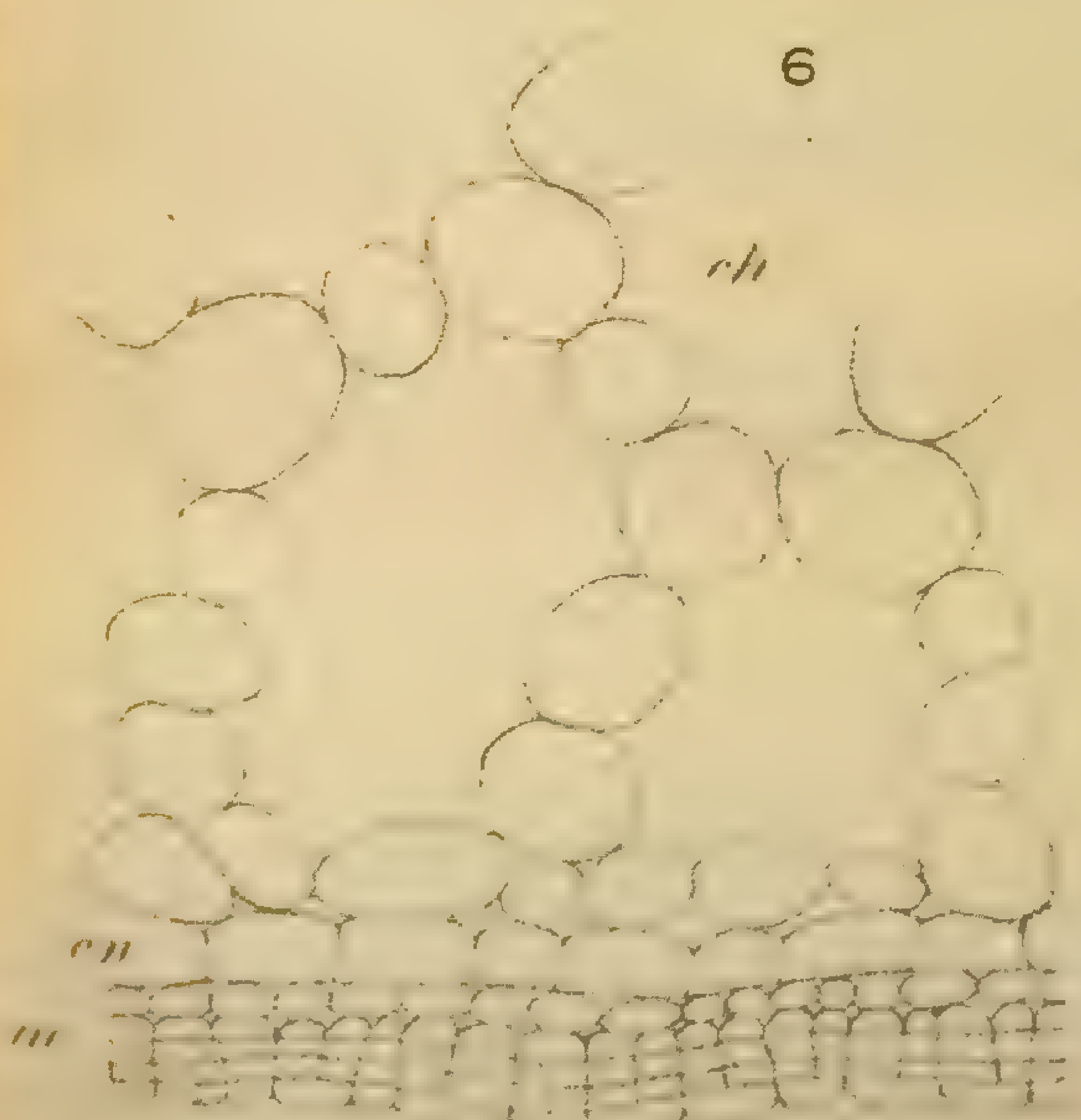

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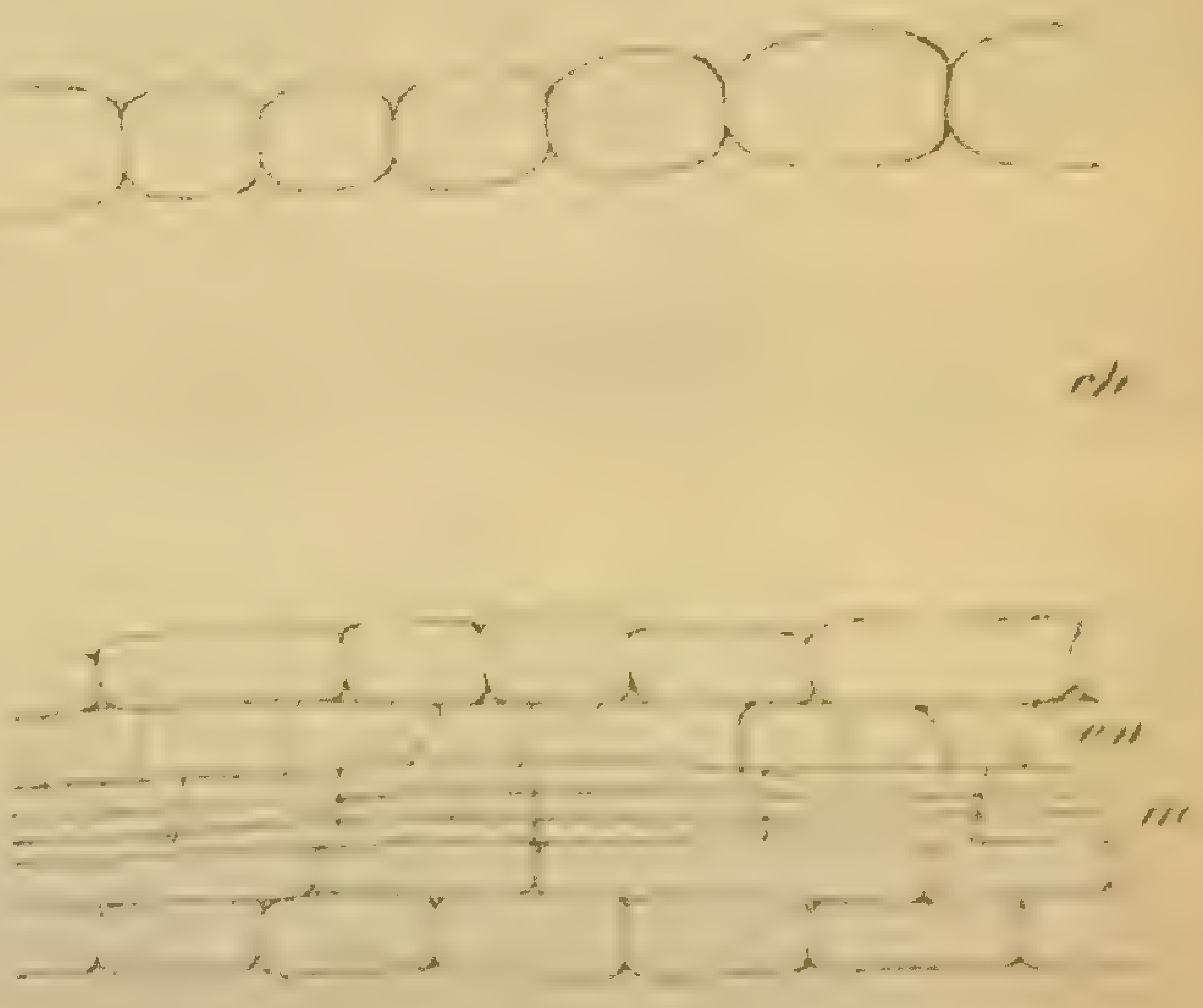

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Vol. XVI. JANUARY, 1889. No. 1.

BULLETIN

OF THE

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A MONTHLY JOURNAL OF BOTANY.

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CONTENTS:

PAGE.
Some New or Imperfectly Known Algæ of the United States.—I.: *W. G. Farlow.* 1
An Enumeration of the Plants Collected by Dr. H. H. Rusby in South America, 1885-1886.—IV.: *N. L. Britton* 13
Additions to our Native Flora: *Thos. C. Porter* 21
Botanical Notes.—Lycopodium lucidulum Bulblets, *E. E. Sterns;* Dianthus Armeria, *E. E. Sterns;* Willow-galls, *M. S. B.;* Weeds, *Byron D. Halsted;* Oxybaphus nyctagineus, *W. W. Bailey;* Variegated Kalmia, *E. Lewis Sturtevant;* trifid style in Mentha piperita, *Thos. Meehan;* Eclipta procumbens, *Thos. Meehan;* A New Foreigner, *Thos. C. Porter.* 21

PAGE.
Reviews of Foreign Literature.—Cell membrane of the Desmids: Culture of Lichen building Ascomycetes without Algæ: Germination of Lichen spores on Moss protonema: Spermatia of the Ascomycetes........................... 25
Recent American Literature.—Black Rot: Botany for Academies and Colleges: Flora of the Vicinity of San Francisco: Primula Rusbyi: Report of the Botanist New York State Museum of Natural History: Synopsis of the Medical Botany of the United States, and briefer notices.......... 30
Proceedings of the Club............... 37

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CONTENTS:

PAGE.
White Mountain Willows.—II.: *M. S. Bebb* 39
First Glimpses of South American Vegetation: *Thomas Morong* ... 43
On Gyno-Diœcious Labiatæ: *Thomas Meehan* 49
Notes on the Flora of the Palisades of the Hudson: *Eugene P. Bicknell* 51
Gentiana alba, Muhl.: *Thos. C. Porter* 53
Onondaga Indian Names of Plants: *W. M. Beauchamp* 54
PAGE
BOTANICAL NOTES.—The Audubon Monument. The National Museum at Costa Rica 55
RECENT AMERICAN LITERATURE.—Botanical Notes from California; Cyperaceæ from Equador, collected by M. Andre; Eugenia Garberi; New Fungi and the Journal of Mycology; Plants of the Lackawanna and Wyoming Valleys; White Huckleberries, and briefer notices
PROCEEDINGS OF THE CLUB

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CONTENTS:

PAGE.
An Enumeration of the Plants Collected by Dr. H. H. Rusby in South America, 1885 1886.—V.: *N. L. Britton*.............. 61
Euphorbiaceæ Mexicanæ: *C. F. Millspaugh* 65
Aster cordifolius, L., and Two New Varieties: *Thos. C. Porter*.................... 67
Elastic Stamens in Compositæ: *Thos. Meehan* 68
Additions to the Iowa Flora: *A. S. Hitchcock*.. 69
On a Fossil Marine Diatomaceous Deposit from Atlantic City, N.J. (Plate lxxxix:) *C. Henry Kain and E. A. Schultze*........ 71
The Ideal Ovary: *E. E. Sterns*............ 77
BOTANICAL NOTES.—A proposed Flora of Mt. Desert; Professor R. A. Philippi: American Hepaticæ; Raspberry and Blackberry hybrid...................... 78
PAGE.
REVIEWS OF FOREIGN LITERATURE.—Influence of Seed production on growth and reserve material; Hymenoconidium petasatum, a new fungus; Chlorophyll bodies of the Selaginelleæ; New species of Cyperaceæ; The Genus Scirpus..... 79
RECENT AMERICAN LITERATURE.—Botany of the U. S. Expedition to Lady Franklin Bay; The Genus Ceanothus; New Species of Chorizanthe; Gymnocladus dioicus; Contributions to American Botany; Flora of Montebello, Quebec; Lichens of Patagonia; Potamogeton perfoliatus, var. Richardsonii; Rosa humilis, var. triloba; Distribution of Vernonia in the U. S.; White Huckleberries....................................... 84
PROCEEDINGS OF THE CLUB............... 89

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CONTENTS:

PAGE.
Contributions to the Bryology of Canada, *John Macoun* 91
A Descriptive List of Staten Island Diatoms: (Plate XC.) *E. A. Schulze.* (Continued.) 98
Some new North American Lichens: *John W. Eckfeldt* 104
Contributions to American Bryology—I *Elizabeth G. Britton.* (Plate XCI) 107
BOTANICAL NOTES.—The Botanical Society of Western Pennsylvania; Heterogamy in *Alnus serrulata*: *Alice B. Rich* 112
REVIEWS OF FOREIGN LITERATURE.—The Orchids of the Cape Peninsula 113
Studies on the Tilopterideæ 113
RECENT AMERICAN LITERATURE.—Botany of the Biologia Centrali Americana; Desmids from Massachusetts: Flora Brasiliensis, Melastomaceæ: New Species from Guatemala Potamogeton varians, Morong The Genus Panicum in the United States; History of the Strawberry; Revision of North American Umbelliferæ, and briefer notices. 116
PROCEEDINGS OF THE CLUB 123

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CONTENTS:

PAGE.
Preliminary Note on the North American Species of the Genus *Tissa*, Adans: *N. L. Britton* 125
The Germination of Pollen: *Byron D. Halsted* 130
Flora of Richmond Co., N. Y.—Additions and New Localities, 1886-1889: *Arthur Hollick* and *N. L. Britton* 132
Observations upon Pollen Measurements: *Byron D. Halsted* 135
BOTANICAL NOTES.—Notelets: *W. W. Bailey*; *Solanum rostratum* and *Blephilia ciliata*: *C. F. Millspaugh*; Two leaved *Pinus rigida*: *R. E. Schuh*; The proposed Botanical Garden 136
REVIEWS OF FOREIGN LITERATURE.—The Flora of West Yorkshire; The Development of *Pilularia globulifera* 137
RECENT AMERICAN LITERATURE.—Contributions to the Life Histories of Plants; Enumeratio Plantarum Guatemalensium; Journal of André Michaux; Mosses found at Ottawa; *Nelumbo speciosa* naturalized at Bordentown; Nouvelles Remarques sur les Roses Americaines; Vegetation of the San Benito and Cedros Islands; Cultivation of *Shortia* in England; Our Worst Weeds, and briefer Notices 139
PROCEEDINGS OF THE CLUB 146

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CONTENTS:

PAGE.
Notes on the Botany of Humboldt County, California: *E. R. Drew* 147
An Enumeration of the Plants collected by Dr. H. H. Rusby in South America, 1885-1886.—VI.: *N. L. Britton* 153
Remarks on the Group Carolinæ of the Genus Rosa.—I.: *G. N. Best* 161
BOTANICAL NOTES.—Corrections; *Pinus rigida*, Mill.—*J. I. Northrop*; *Viola palmata*, L.:—*J. I. Northrop*; *Synedra pulchella*, var. *abnormis*: *E. A. Schultze*; The Journal of Mycology 163
REVIEWS OF FOREIGN LITERATURE.—A Monograph of the British Uredineæ and Ustilagineæ; Monographia Cladoniarum Universalis; Plants of Kohima and Muneypore; Neue Beitrage zur Moosflora von Neu-Guinea 165
RECENT AMERICAN LITERATURE.—Abies lasiocarpa and its Allies; Catalogue of the Flowering Plants and Ferns of Kansas; Bastin's College Botany; Disease of Colocasia in Jamaica; Contributions to the Life Histories of Plants, IV; New Nyctaginaceæ; Outlines of Lessons in Botany; The Home of *Shortia*; New or Noteworthy Species from the West Coast; Some Californian Umbelliferæ; Notes on Wisconsin Weeds; West American Oaks, and briefer notices 167
PROCEEDINGS OF THE CLUB 178

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CONTENTS:

PAGE.
The Fresh-water Algæ of Maine—II. *F. L. Harvey* 181
An Enumeration of the Plants collected by Dr. H. H. Rusby in South America, 1885-1886—VIII.; *N. L. Britton* 189
Corema in New Jersey; *John H. Redfield* .. 193
BOTANICAL NOTES.—Kansas Fungi; Pittonia; The Memoirs of the Club; White-fruited *Mitchella* again; Note on *Tissa* .. 196
REVIEWS OF FOREIGN LITERATURE.—A Handbook of Cryptogamic Botany: Lichenes Novæ Zelandiæ 197
RECENT AMERICAN LITERATURE.—Aerating Organs on the roots of Swamp and other Plants; Analogies and Affinities; Studies of the Types of various Species of the Genus *Carex*; Beitrage zur Kenntniss der Chrysobalanaceen; Revision of North American Ilicineæ and Celastraceæ; What is Lichenopsis? List of Plants collected by Dr. E. A. Mearns at Fort Verde and in the Mogollon and San Francisco Mts., Arizona; Floral Characters of the Region; The Life History of *Macrosporium parasiticum*; Report of the Botanist New York State Museum of Natural History, for 1886; North American Rhamnaceæ, and briefer notices 199
PROCEEDINGS OF THE CLUB 206

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CONTENTS:

PAGE.

On a Fossil Marine Diatomaceous Deposit from Atlantic City, N. J.—II.: *C. Henry Kain* and *E. A. Schultze*. (Plates XCII. and XCIII 207
White Mountain Willows.—III.: *M. S. Bebb* 211
Aphyllon fasciculatum in Montana: *F. W. Anderson* 215
Notes from the Phillippine Islands 217
Carex umbellata, Schkuhr: *L. H. Bailey* .. 218
Notes on Two *Rhododendrons*: *Thos. C. Porter* 220
New Californian Plants: *J. G. Lemmon* .. 221
REVIEWS OF FOREIGN LITERATURE.—The Motion of Diatoms; The Walls of suberous Cells 224
BOTANICAL NOTES.—*Cladosporium epibryum*; Botanical Exploration of Asia Minor; Meetings of the Botanical Club A. A. A. S. at Toronto; Recent advices from Dr. Morong; *Pogonopus febrifugus* 225
RECENT AMERICAN LITERATURE.—The citation of Authorities; A hybrid *Catalpa*; *Eschscholtzia Californica*; Fossil Plants of the Triassic Rocks of New Jersey and the Connecticut Valley; Loco Weeds; Mission Viticole en Amerique; Poisonous Plants of California; Reports of the Botanists of the Department of Agriculture; The genus *Staphylea*; North American Willows; *Zizyphus Chloroxylon* and briefer notices 227

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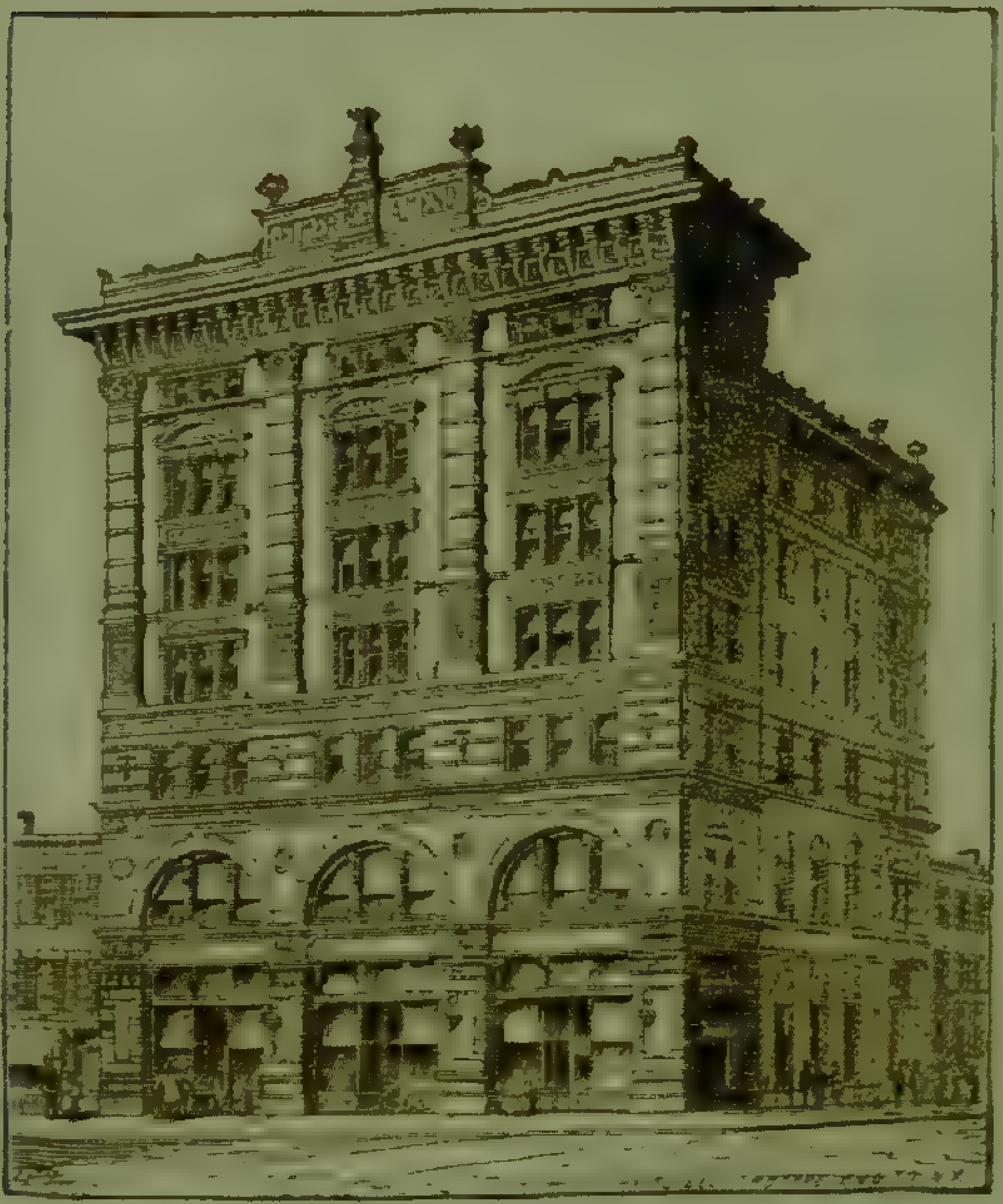

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CONTENTS:

PAGE.
List of the North American Andropogoneæ, compiled from Prof. E. Hackel's Monograph: *F. Lamson Scribner*........ 233
Proceedings of the Botanical Club, A. A. A. S., Toronto Meeting, August 28th—September 3d, 1889..................... 242
BOTANICAL NOTES.—Biology at the University of Pennsylvania; *Greeneria fuliginea* in Italy; The Memoirs of the Club.................................... 248
REVIEWS OF FOREIGN LITERATURE.—Germination of Lichens on Moss Protonema; Experiments with inverted stems. 248
RECENT AMERICAN LITERATURE.—Generic Synopses of Basidiomycetes and Myxomycetes; Edible Plants of the World; Papers on Fungi; Notes on our Hepaticæ; Kansas Fungi, Fasicle II.; *Lepidium Virginicum* in Italy; Marine Algæ of the New Jersey Coast and the adjacent waters of Staten Island; North American Roses; What is a Sycamore?; "The Botanist," and briefer notices... 252

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CONTENTS:

PAGE.

An Enumeration of the Plants collected by Dr. H H. Rusby in South America, 1885-1886.—VIII.: *N. L. Britton* 259

A Trip among the Rangely Lakes: *L. N. Johnson* 263

Botanical Notes (Plate XCIV.): *A. J. Foerste* 266

Remarks upon Color as a Distinguishing Feature of Certain Species of Plants: *Joseph F. James* 268

The Classification of Slight Varieties: *T. D. A. Cockerell* 270

Remarks on the Preceding Paper: *N. L. Britton* 272

The Mandioca: *Thos. Morong* 273

PAGE.

BOTANICAL NOTES.—Note on *Harfordia*: *C. C. Parry*; *Utricularia resupinata*: *Thos. C. Porter*; Note on *Viola palmata*: *O. R. Willis*; *Gaylussacia resinosa*, var. *leucocarpa*; A proposed new genus of Cyperaceæ: *Psoralea esculenta* 277

REVIEWS OF FOREIGN LITERATURE.—Structure of the Vittæ in the Fruit of Umbelliferæ 279

RECENT AMERICAN LITERATURE.—Recent Field-notes on *Ceanothus*; Notes on *Hydrocotyle Americana*; Lauraceæ Americanæ; *Lewisia*; Lichenes Oregonenses; List of Plants collected by Dr. Palmer in Lower California; Smut of Wheat and Oats 280

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CONTENTS:

PAGE.

The A. A. A. S. Botanical Club's Trip to the Lakes of Muskoka, Ontario, August 31 to September 2, 1889 285

The New Locality for *Subularia aquatica*: *David F. Day*.......................... 291

The Wave-growth of *Corydalis sempervirens*: *Thos. Meehan*.......................... 293

Pinus Banksiana on the Coast of Maine: *Edward L. Rand*...... 294

Pinus Banksiana with *Corema Conradii*: *John H. Redfield*.......................... 295

PAGE.

Notes on some Botanical Reading done in the Laboratory of Professor Schwendener, in Berlin, in June and July, 1889: *Emily L. Gregory*.................. 297

RECENT AMERICAN LITERATURE.—Scientific Papers of Asa Gray; Handbook of the Bromeliaceæ; The Fourth Century of Canadian Mosses; The *Dahlia* Conference; Vegetation of Hot Springs; The Lake Erie Shore as a Botanizing Ground; Notes upon some North American Trees; The Podostemaceæ and briefer notices........................ .. 305

PROCEEDINGS OF THE CLUB...... 313

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AND OTHER MEMBERS OF THE CLUB.

CONTENTS:

PAGE.

On the floating-tissue of *Nesæa verticillata* (L.), H. B. K. (Plates XCV-XCVII): *Jos. Schrenk* 315

An Enumeration of the Plants collected by Dr. H. H. Rusby, in South America, 1885–86—IX: *N. L. Britton* 324

The Classification of Slight Varieties: *L. H. Bailey* 328

Notes from New Hampshire: *W. Whitman Bailey* 329

BOTANICAL NOTES.—Florida Lichens: *W. W. Calkins*; *Aphyllon fasciculatum*: *L. N. Johnson*; Roses for M. Crépin; A Correction 330

REVIEWS OF FOREIGN LITERATURE.—British Moss Flora, Part XII.: Aerenchyma, a new Paper on Plant Aeration........ 331

RECENT AMERICAN LITERATURE.—*Boleti* of the United States; Botanical Latin; Notes on some British Carices; Vegetative characters of the species of *Cicuta*; Flora Brasiliensis; Lessons in the Structure, Life and Growth of Plants for schools and academies; The Genus *Lythrum* in California; The Nymphæaceæ; Observations on *Rosa Engelmanni*; New or Noteworthy Species 333

PROCEEDINGS OF THE CLUB........ 340

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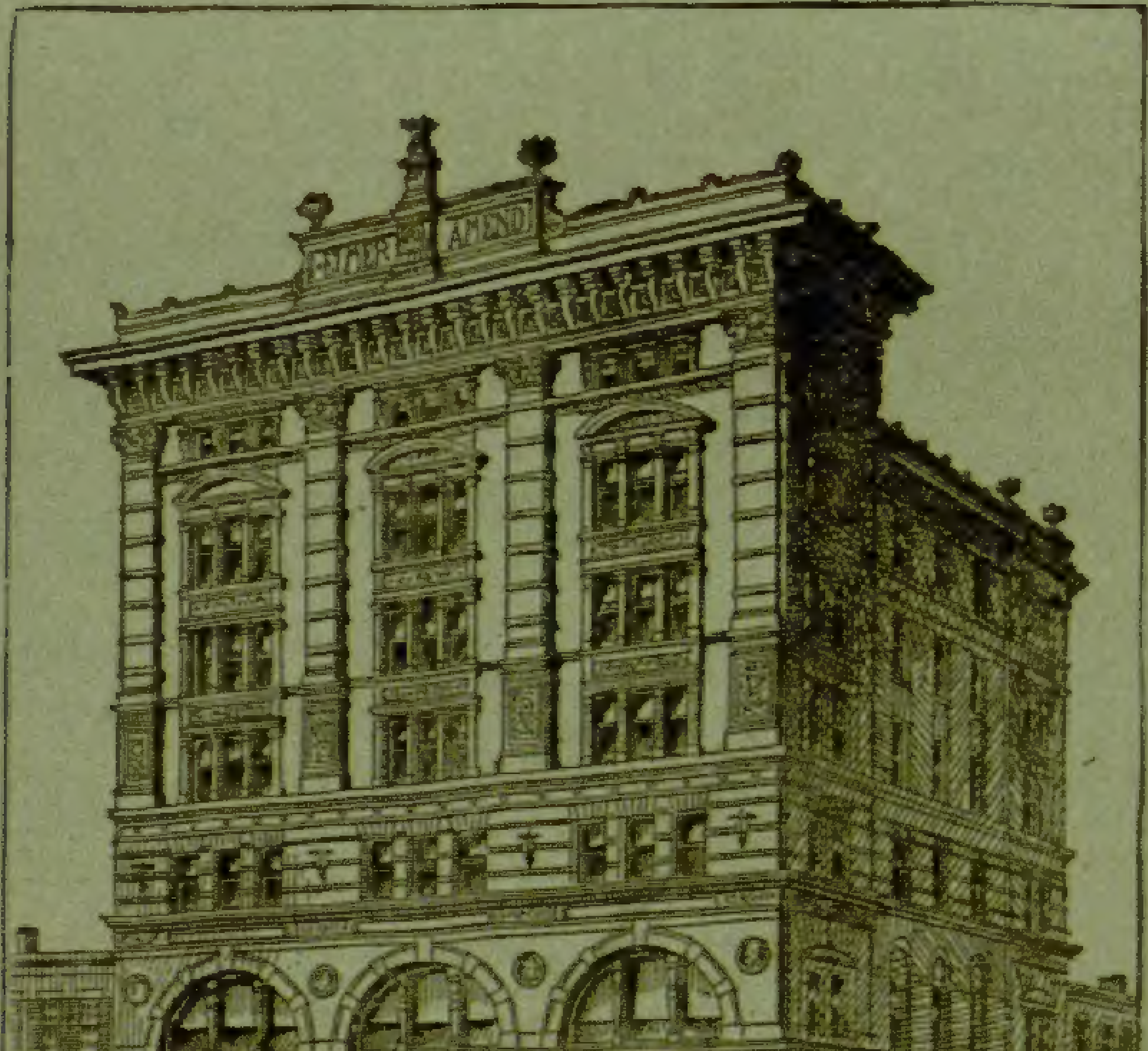

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